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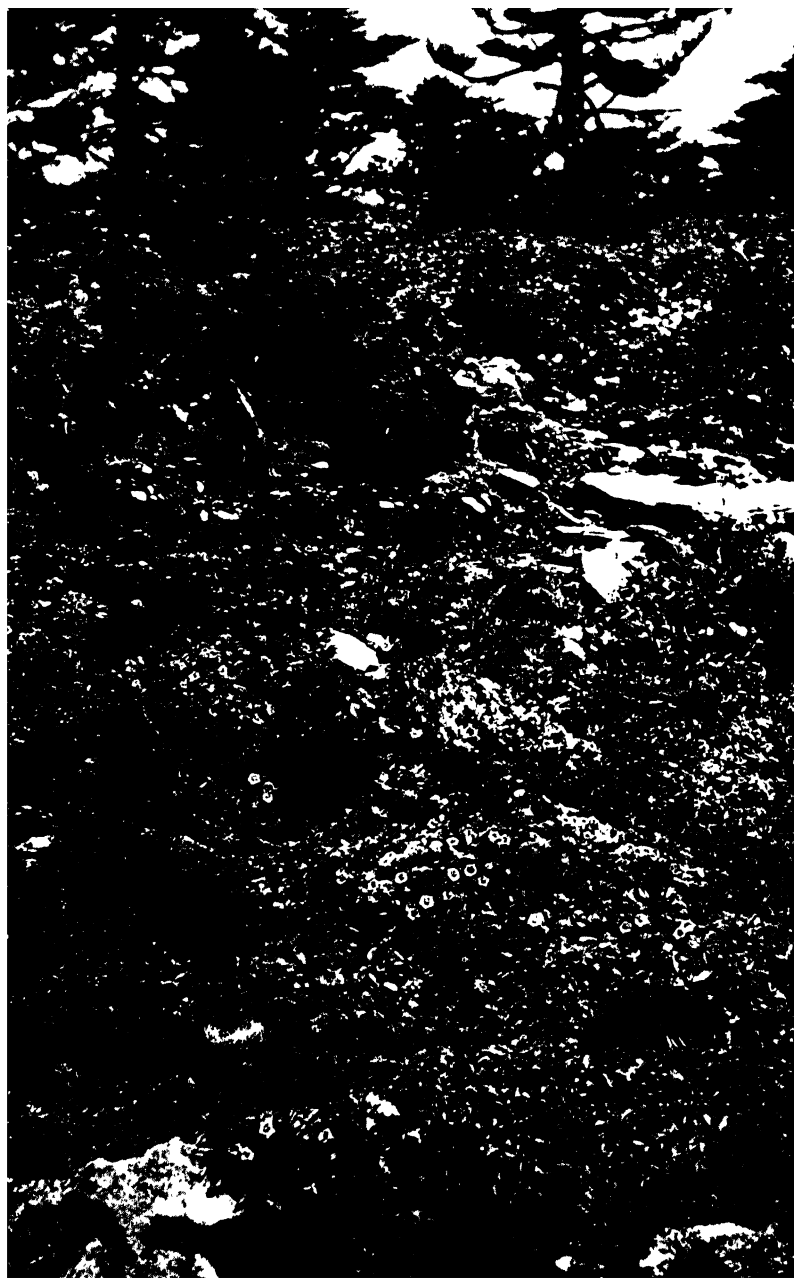
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COMMONSENSE ROCK GARDENING

By the same author

FROM CHINA TO HKAMTI LONG
PLANT HUNTING IN THE WILDS
THE RIDDLE OF THE TSANGPO GORGES
PLANT HUNTING ON THE EDGE OF THE WORLD
THE ROMANCE OF PLANT HUNTING
A PLANT HUNTER IN TIBET
THE ROMANCE OF GARDENING
PLANT HUNTER'S PARADISE
MODERN EXPLORATION
ABOUT THIS EARTH
ASSAM ADVENTURE



COMMONSENSE ROCK GARDENING

by

F. KINGDON-WARD

B.A. (CANTAB.), F.L.S., F.R.G.S., V.M.H.

*(Gold medallist, Royal Geographical Society, Royal Scottish
Geographical Society, Massachusetts Horticultural Society,
Royal Horticultural Society)*



*Illustrated from photographs
taken by the author*

JONATHAN CAPE
THIRTY BEDFORD SQUARE
LONDON

[*facing*: NATURE'S ROCK GARDEN IN AUTUMN. ASSAM
HIMALAYA. 13,000 FEET

FIRST PUBLISHED 1948

**PRINTED IN GREAT BRITAIN IN THE CITY OF OXFORD
AT THE ALDEN PRESS
BOUND BY A. W. BAIN & CO. LTD., LONDON**

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FOREWORD

Rock gardening is great fun. I have built myself several small rock gardens in this country, with bricks and stones and cement and logs of wood, when I had no better materials, and grown good plants on them too. Anyone who cares about plants, and understands them, can do the same.

But the best rock garden I ever built was near my camp in the Adung valley, in the 'Burmese Oberland'. I could grow anything there, including *Primula Dickieana* and 'Blue Bubble' (*Gentiana Wardii*). I used to bring slabs of alpine turf containing plants right away down from 12,000 or 14,000 feet, and plaster them on to my rock garden in the valley at 10,000 feet.

I have tried to point out something of the strained relationship between rock gardens, plants, and alpine hills — nature's rock garden if you like. It is for that reason I have illustrated it with photographs of plants growing in the mountains; there are many books with excellent illustrations of plants growing in rock gardens; it seems unnecessary to add to them.

For the same reason I have not given a list of plants — with more or less tendentious descriptions — 'suitable for the rock garden'. Every nursery catalogue gives you that much — free.

But anyhow, rock gardening is fun.

F. K-W.

Stone: Aylesbury

1947

To my sister
WINIFRED

COMMONSENSE ROCK GARDENING

CHAPTER I

GARDENS, GARDENERS, AND GARDENING

GARDENING consists first in making selected plants grow; that is to say, in making the conditions such that they *can* grow — and by grow I mean not just keep alive, but give of their best, whether in colour, fragrance, shape, health, vigour, resistance to disease, and not least in reproduction. Such is life at top level. A garden, however, is something more than a collection of healthy plants, however beautiful individually. There may be beauty in a neglected garden, or even in a haphazard collection of plants, at least in summer, for colour is always beautiful. But nobody who lacks a nice appreciation of beauty, taste and an artistic sense, can make a garden; for a garden is something one must compose. This is true of the most formal garden in two dimensions, and even more so of a rock garden in three.

Garden plants do not need to fight for their lives, except perhaps with the climate. Competition between them is no longer cut-throat; which emphasizes the difference between a garden and nature. In the alpine region also competition between plant and plant is reduced to a minimum, while the struggle with the elements reaches a new high.

The designing of a rock garden, the changing colour pattern, and the lay-out have nothing to do with making plants grow. Of course you must know what the plants look like when they are grown up — see them in your mind's eye as it were. But you can design a brave garden without making a single plant grow.

On the other hand you may be a skilled gardener, and still have no idea of how to arrange your plants to the best advantage in the rock garden, or how to select the best

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material. Some people are born with green fingers and when it comes to growing plants they can do no wrong. The combination of green fingers and an artistic sense is rare.

What do we mean by green fingers? It is easier to say what is meant than to give reasons. By green fingers we imply that instinctive sympathy between man and plants which is more often seen between man and animals; the deep call of life to life; the appeal of the rich, living earth to what is divine in man. That there must be an underlying cause not yet understood is certain. But whether this is in the form of currents or waves — everything is measured in waves to-day, as heat waves, brain waves, crime waves, waves of unrest or other elusive rhythm — or is instinctive is not known. The power of water-divining may possibly be traced to the same cause. Whatever the cause the effects of green fingers are familiar. There are people who have only to stick a piece of vegetable matter with a spark of life in it in the ground to make it glow and grow. The person who finds himself the lucky possessor of green fingers ought not to waste such a talent. Of course some people pooh-pooh the whole thing.

However, more people are born without green fingers than with, and for them the task is harder and less congenial. Indeed, unless the making of a garden is congenial it is better to leave it alone. But for those who are drawn towards gardening by a love of the soil, who take a delight in seeing plants grow and blossom, who feel a yearning for the throbbing beauty of colour, gardening whether in two dimensions or three is a most blissful occupation. Therefore at least give it a trial. Begin with gardening in two dimensions. Then, if you enjoy it, and the spirit moves you, go on to three dimensions. Nor do you need to have green fingers to enjoy gardening, though assuredly if you have, nothing can keep you away from it once you realize your alliance with nature.

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But if it proves a penance, if you find digging, planting, and weeding a drudgery — and all this has nothing to do with green fingers — my advice to you is to give it up. You can always keep goldfish. Unless you enjoy hard work, enjoy planning and watching and waiting, and can bear repeated disappointment with patience, gardening is not for you.

Three pieces are needed to fit together the jigsaw of the rock garden. First there is the soil, which of course is important. And yet it is not so much the soil itself as what is in the soil that is important. But what is in the soil, especially its living content, is to some extent responsible for its physical condition, and is in turn, to some extent, governed by its physical condition. Action and reaction play their part in the vital as in the physical world.

Then there is the rockwork. That also is important, though less so than the soil. Its role is physical rather than chemical. It is of course the rocks which carry our two-dimensional garden into the realm of a third dimension. They also support the soil, and by weathering supply it with certain soluble salts of the elements which all plant life needs; to that extent rocks play a chemical role. Their most important function, however, is to store up and reflect heat; they also radiate heat quickly and therefore may be said to reflect cold. Further, they absorb and hold moisture, assist drainage, and perform other minor functions. They also attract slugs, snails, woodlice and other undesirable creatures.

To the outward eye the rockwork is the rock garden. But in the life of most alpine and rock plants, or at least most rock garden plants, it probably plays a subordinate part. Nevertheless, it is something more than a framework.

Finally, there are the plants, for the benefit of which the soil and the rocks exist. Inherent in every live thing, plant or animal, is the urge to live, to grow, to reproduce its kind — the urge for immortality. The soil and the rocks are there

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to help the plant to realize this urge. That they are not always successful, that many plants die on the rock garden before their time, without ever setting seed, is a matter of common observation. Which is to blame, soil? or rocks? or both? — or neither, at least altogether? Repeated failure to cultivate certain alpine plants, especially those from a high altitude, *may* be due to the fact that we have never yet managed to produce the soil conditions necessary for their salvation. But personally I hold firmly to the view that alpine gardeners as a class make a fetish of the soil to which it is not entitled on its merits — or lack of them. Many a partial success is immediately put down to some marvellous patent soil mixture — three parts of this and two of that and one of the other — measured out like a doctor's prescription, without warrant. Many a failure is hastily and unjustly ascribed to the soil. And when praise for success or blame for failure is, with some reason, pinned on to the soil, it is as likely as not to be ascribed to the wrong factor; to the physical condition rather than to the living contents or to the chemical properties.

But other factors besides soil influence the rock garden, and not the least of these is climate. It has been said that Britain has no climate, only weather, and there may be some truth in the epigram; but not the whole truth. It is also true to say that Great Britain has two climates: a cool maritime climate in the western half and a semi-continental temperate climate in the eastern half. A perpendicular dropped from Berwick due south to Bournemouth marks roughly the dividing line. West of the line is a maritime climate — the west coast of Scotland is milder than the coast of Essex; east of it is a semi-continental climate. Curiously enough, our two most famous botanic gardens, Kew and Edinburgh, are both situated in the eastern half of the country. However, as though to make up for this lapse, many of our most famous private gardens are located west of the line, and especially in the extra mild south-west. Devon and Cornwall, in fact,

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have earned for themselves the title of the Garden of England. So too has Kent!

It must be noted that we are far from understanding why certain plants won't 'do' with us, even though their mates, growing alongside them on the same alp, flourish in captivity like the unjust. We may as well admit our ignorance, though it is the custom of some authors to throw out a squid-like smoke screen of dope words in order to conceal it. Thus they will describe a plant which flourishes for a time, then unaccountably goes back on us, as 'miffy' — whatever that may mean. What it really means, of course, is that there was no inquest. Such dope words are eagerly seized upon and repeated by the mentally lazy, because they conveniently by-pass awkward facts.

So far as gardens are concerned Great Britain is the perfect island of the blest. Where else could you find, within so small a space, plants from almost every temperate land in the world and from many not so temperate, as well as from almost all the great mountain ranges, growing happily side by side with the native flora in the open air?

From the snowy Alps and Himalayas, and from the fringes of the great desert belt which stretches right across the old world, we have gathered our plants. From the lonely Southern Ocean, from New Zealand and Tasmania and from South Africa, land of heather and daisies and an almost infinite variety of bulbs, we have taken the best they had to offer. Nor has the New World been less generous. From British Colombia to California and across the continent to New England and the Allegheny Mountains, from Mexico and the Cordilleras, from Patagonia and the Pampas, have come some of our most treasured plants. It would be difficult to find anywhere in the world a country, a mountain range, even an island outside the tropics which has not contributed some plant. And the rock garden especially has benefited from this world-wide levy.

Most people have heard of Kew even though they may

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never have seen it. Though hardly more than two hundred years old it is the most famous botanic garden in the world. And with good reason; for in spite of its unfortunate position on the outskirts of London, whose factories pollute its air, and a somewhat harsh climate, an astonishing variety of plants is cultivated there, either in the open or under glass.

Yet there were gardens thousands of years before Kew. Some of the earliest words in the Bible are about a garden. The seventh wonder of the ancient world was a garden, and a hanging one at that; of its green plants we know nothing, but its architecture has kept its memory green for 5000 years. The Chinese had gardens and cultivated flowers several thousand years ago. When men scattered the first seeds of cereals round their caves to save themselves the trouble and uncertainty of food gathering, they made the first kitchen garden; that must have been not less than 7000 years ago.

It is certain, therefore, that gardens as we know them in the West to-day are descended from many different styles throughout the ages. The three-dimensional modern rock garden is Britain's contribution to the art.

Rock gardening is 75 per cent empirical. No matter how often your neighbour fails with a plant, *you* may succeed. Of course this principle of trial and error need not be pushed to absurd lengths. Even so hit-and-miss a practice as rock gardening has accumulated some useful experience. Few of us would try to grow pineapples for example in our rock garden, because, though we ourselves have never experimented with pineapples — and failed — we are prepared to accept the experience of others who have. Actually a vast store of knowledge concerning plants and how they grow has been garnered along with the plants themselves, and we should be foolish indeed if we did not avail ourselves of it. The beginner is therefore advised to take certain things on trust; he will still have ample scope for experiment.

Why does one man succeed with a plant where a score fail?

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The answer may be — green fingers!

No. I'm afraid I cannot tell you the underlying cause of green fingers; I can only point to the result. As already remarked, if you are the happy possessor of green fingers, almost every plant you touch will grow, nay, almost any bit of plant will come alive in your hands; and if not, not.

But I do not know why, any more than I know why everything which King Midas touched turned to gold.

But there may be other reasons besides green fingers. Every plant differs slightly from every other plant of the same species, not only in appearance which is not apparent, but in constitution which is invisible. Some plants are sickly and others robust, some adaptable, others unyielding. In fact they are just like human beings; and like human beings they rarely show how tough they are by outward and visible signs.

In most parts of Great Britain, though it is necessary to weed your rock garden regularly in order to concentrate on your choicest plants, which thrive at the expense of those you discourage, this is no Herculean task. It would, however, be a waste of time to try to build a rock garden in Bengal, or on the banks of the Congo, or at the back of Port Moresby. Even if you succeeded in keeping such places clear of trees, thickets of grass, bushes and climbers would spring up faster than you could cut them down. The rock garden is for temperate lands only.

On the other hand it would be a work of supererogation to make a rock garden in the Himalayas where so many rock garden plants are at home. In the equatorial belt, a region of constant high temperature, high rainfall, and high humidity, forest overwhelms the earth and trees spring up as fast as you cut them down. Rock plants cannot compete. In the Arctic, where it is too cold for trees, *all* plants are suitable for the rock garden. Again, round the shores of the Mediterranean, where it is almost too dry for trees, many of the plants are rock plants.

In deserts, on the other hand, which are regions of no

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rainfall and no humidity, whether hot or cold, rock plants do not grow only because no plants grow. Hence rock gardens are impossible here too, though there is no lack of rock. In fact deserts and high alpine regions display the rock garden structure without its contents, without its soil and without water.

But we seem to have wandered too far from the modest outcrop rock garden with which we are concerned. •Let us merely observe that the great gardener is not he who owns the largest garden, but he who is most in touch with his plants; he who is always experimenting, always learning. He may not win many of the pots or medals of the horticultural world, but he knows much more about plants than many of those who do. To be a great gardener a man must be close to Mother Earth in spirit, able to work with his hands as well as with his brain; a man who loves the growing plant and will sacrifice material things to understand it. It was such men as these who in the twentieth century made English gardens and English gardeners the envy and pride of the world, who put the hardy rock plant in the van of horticulture, designed the rock garden, and the landscape garden, discovered the alpine, and showed the world how gardening might bring peace and contentment to a ravaged generation. So at one end of the scale is the rich man with a large garden who employs many gardeners — and he himself may be a great gardener; at the other end is the owner-gardener who takes off his coat, and has even been seen on all fours. He does most of his gardening during the week-end, for he is a busy man; you may see him too amongst his roses and in what he calls his potting shed (it is also the tool shed) on summer evenings. He is a skilled craftsman with a wide knowledge of plants, which he shares with his neighbours.

Thus gardeners vary even more than gardens, from the green-fingered owner-gardener to the pudgy-fingered garden owner who buys the ready-to-wear garden complete with rocks, rock plants, and labels.

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Finally, we may note in passing one more type whom we will call the catalogue gardener. He — or more often she — studies the nursery catalogues, can glibly repeat the names of all the plants commonly grown — and many not so commonly grown; and though his — or her — gardening operations are confined to cutting flowers for the boudoir, she nevertheless passes amongst the undiscerning as a keen horticulturist. He or she falls an easy prey to the more predatory type of nurseryman who organizes his spring sale, at which he sells off his surplus stock of sixpenny plants for sixpence, with one eye on the catalogue gardener.

And with these few kind words we may pass on to the rock garden itself.

THE ROCK GARDEN: WHAT IT IS

Rock gardening is gardening on the up and up in three dimensions, as opposed to gardening on the level, which is gardening in two dimensions. Therein lies its appeal; it is always more amusing to do and to think solid than flat. Beyond this it is inadmissible to go. Gardening in the fourth dimension is not a practical proposition, and those who indulge in it, substituting flights of imagination for the more utilitarian flights of steps, generally end up by driving the rock garden, plants and all, into the *ewigkeit*.

There is another important difference between rock gardening and gardening on the level. The successful rock gardener is a skilled craftsman, not a mass producer. Each separate plant, that is each tiny part of the whole, receives individual attention at his hands. It is hand-planted, hand-plucked, hand-weeded — which means real hard work. The pure food addict may swear by the slogan 'untouched by human hand'; the rock gardener's slogan is 'hand-picked'.

A rock garden may be formal or informal. But whichever it is, it remains a work of art. An informal rock garden does not mean a natural rock garden. There is no such thing as a 'natural' rock garden, except rarely where some enthusiast has converted a sea cliff, or an escarpment, or a disused quarry into a rock garden. The background is then, of course, more or less natural. But the more it is planted, the less natural it becomes, and its effectiveness as a garden is inversely proportional to its kinship with nature, as well as directly proportional to the taste and industry of the owner-gardener.

Many people seem to think that an informal rock garden is a page from nature's own book, and that as they dig and build, laying stone against stone cunningly, fashioning here a ledge and there a niche for some favourite, till the whole

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pattern of rock and plant is complete, that they are imitating nature. They would be quite hurt if you told them that the final result is nothing like nature's handiwork. They might feel less so if you told them, what is perfectly true, that the rock garden they have created is more beautiful than anything nature could have designed.

And so it ought to be. A rock garden is a work of art, and man has at his beck and call resources embracing all nature! He also has the divine gift of an artistic sense, the power of selection. It is because nature works on a scale far beyond the reach of a single man in a single lifetime that we regard her as a supreme artist. And scale alone is impressive. It touches chords deep within us. We see in a flash what it has taken nature a million years to build up. We are stunned by the sheer bulk of the thing — nature is enormously wasteful, and that profligate carelessness deludes us. Compared with this reckless immensity of space and time man's most strenuous effort is microscopic and momentary.

But man's artistic sense is sublime. Nature alone can make the lack-lustre raw diamond in the furnace of the earth's crust. But man's art cuts the jewel to set free the sparkle therein imprisoned like a djinn. So when you feel in despair at the sight of your garden looking drab, and think of the alps at the foot of the everlasting snows quick with the colour of early summer, remember that if you compare it with any part of the mountain landscape the same size, you will not observe a tithe of the colour there. Your rock garden is a concentration of colour and of form which nature, prodigal as ever, would disperse widely. It is not a piece of natural scenery; but it bears a certain likeness to natural scenery. Actually the rock garden is perhaps the most artistic of all man's creations, the highest expression of his aesthetic sense. Here is no crude imitation of nature, but rather a most fastidious selection and re-combination of line, form, and colour, like a Chinese painting, to produce a completely satisfying harmony.

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The rock garden represents neither an alpine landscape in miniature, nor is it a life-size copy of some tiny fraction of the alpine scene. What would be the advantage of reproducing a half-acre of mountain scenery — and it is a large rock garden which covers half an acre! Nature works on such a huge scale, it would be like taking a pebble to represent the Chesil Bank. Regarded as a model, our rock garden would fare even worse. For now our rocks shrink to insignificance, while our plants remain life-size.

Where the rock garden is most unnatural is in its plant contents. Man can bring together plants which nature had put asunder. Here are mingled plants from the Himalayas and from the Andes, from Japan and from New Zealand, from California and from China. Nature set them on different planes. That 'East is East and West is West and never the twain shall meet' is as true of plants as it is of mankind. But, thanks to man, the twain have met in the English rock garden.

I mentioned formal rock gardens. Perhaps the formal garden is not truly a rock garden, though rocks may be used in its construction. And not only rocks, in the form of crazy pavement, but stone troughs and sinks and a cement pool with a parapet. Thus even the formal garden may be three-dimensional and so earn the title of rock garden. But the formal garden with crazy pavement may also be flat like the ordinary green lawn, bordered by beds, which is only another type of formal garden. Both are laid out symmetrically in two dimensions only. Here we are chiefly concerned with the small garden, cottage or villa type, about 35 ft. by 20 ft., covering therefore some 700 square ft. (one-quarter the size of a tennis court), which can be laid out in any of the three ways mentioned, that is to say, as a formal lawn garden, a formal rock garden with or without trimmings, or as an informal rock garden, which means business. It is up to you to choose which you prefer. I need only add that in a very small garden, especially if it is one

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of a row, unless the ground is very uneven, a formal garden looks best. A rock garden, rising like a nunatak from a dead flat plain, looks rather out of place, unless contrived with genius. A few people of more than average taste may get away with it; most people are sure to make a hash of it, the alleged rock garden looking like an attack of mumps. A pile of earth knobbly with brick-bats and clinkers like charred currants, from amongst which a few anaemic-looking ferns peep furtively, though common in India, is practically extinct in Britain, thanks to the vigorous campaigning of G. W. Robinson, whose gospel was later successfully preached by Farrer. Even so, the standard of the smaller English rock garden is not unduly high.

If it is impossible to harmonize the informal rock garden with the landscape it is better to leave it alone.

After all, the formal rock garden or the formal lawn is pleasant to gaze upon and to take one's leisure in. It should aim to be not only restful to the mind but as balm to the bruised soul — and heaven knows in this swift mechanized world, where the individual man counts for so little, balm is needed often. A formal garden offers limited scope to the keen gardener, offends nobody, and can be constructed with stone, if stone is available; otherwise the familiar lawn garden with rectangular beds down either side of the path, at least one good hedge, and a clump of 'pampas' grass in the corner, will serve our purpose. In these days nobody is likely — certainly no real plantsman is likely — to make a tennis court, supposing the lawn to be just large enough to take a tennis court. Such vandalism is happily becoming rare. Gardens are not places where one takes violent exercise; they are meant for leisure, contemplation and the pursuit of horticulture. This may sound selfish, the grown-up point of view; children are rarely interested in horticulture, more rarely in leisure, never in contemplation. But surely our way of living — I refrain from calling it 'civilization' only because the word is ambiguous — surely our way of living

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has advanced to the point where every community has its own sports club, a golf course, perhaps, and in the summer a tennis and cricket club. Games are, or should be, communal.

Of course, we relent when children want to play in the garden, nor is it unknown for parents to consign them there to do just that. 'Run away and play', says father, meaning 'efface yourself in the garden'. They may play hide-and-seek, or flags ('French and English' in my young days), or even French cricket on the lawn, if it happens to be that sort of garden. Badminton too takes up little room and the shame of it is as easily hidden as the traces of it are removed. But this is very different from turning the garden into a sports ground.

The amateur gardener constructing his first rock garden has to consider what material to build with before ever he decides what plants to grow. The possible materials vary from bricks and mortar — or cement — to newly quarried rock, stones from the river bed, and logs of timber, or old tree stumps. (We won't mention clinkers from the ashtip; they are tabu.)

Now I strongly advise the beginner to use, if possible, slabs of sedimentary rock — sandstone, limestone, slate, shale, or even schist, which is finely crystalline rock — rather than irregular chunks of coarsely crystalline rock like granite; or, for that matter, rather than squared slabs of granite such as a tombstone mason might provide.

The advantage of using sedimentary rock, whether crystalline or not, is that it is easier to build a harmonious structure with sandstone than with granite. It occurs in more conveniently shaped blocks, weathers better, and has a more pleasing appearance. Moreover, faulty construction is less likely to occur — it is difficult to go wrong if a few simple rules are observed.

But this choice of rock is a counsel of perfection. You may have no choice in the matter if your garden happens

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to be in the Grampians, or the Lake District. I am not now suggesting that you should *buy* rock from another part of the country, though I have no fault to find if you prefer it that way. No doubt it is a wrong principle to introduce sedimentary rock into an igneous district, or even the wrong sort of sedimentary rock into a sedimentary district. But after all, we are not geological purists. I have insisted throughout this book that a rock garden is an artificial creation, and unless it is on a really big scale, to fit in with and form part of the landscape, no more exception can be taken to the construction of a rock garden with alien rock than to the construction of a red brick house on the chalk downs. Moreover, we are certainly going to introduce alien plants, so why not alien rocks!

Perhaps no rock at all is available locally, only bricks, chunks of cement, and paving stones, left over by a contractor. This, of course, applies particularly to new building estates and garden cities which grow up like mushrooms in the fields outside industrial areas and along by-pass roads. But don't be downhearted; it is still possible to build a rock garden with no better material than bricks, broken slabs of cement and logs. The only substance which is absolutely, finally, and irrevocably forbidden is clinker, a sort of petrified black sponge suggesting an extinct volcano, peculiar to apartment houses in Victorian days.

A few brief rules on construction may be given, and so long as they are followed every gardener can give free rein to his imagination and artistic feeling. A more detailed description is given in the next chapter. It will be as well to draw a plan of the proposed building; it need not be elaborate but should be drawn to scale. Otherwise, the rockwork may not develop according to plan, may indeed become badly distorted.

A small rock garden covering a space of say 35 ft. by 20 ft. (700 sq. ft.) cannot afford to straggle in this direction and that, or to be honeycombed with dips and hollows and cosy

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corners. It must be a well-knit compact unit. Thus it should have one general slope, and that to the south or west, rather than a succession of ups and downs. Any other irregularities should be very minor features which in no way detract from the general slope. As to height, there is no standard ratio of height to area — though it is preferable to keep heights low, to build outwards, not upwards. Many large rock gardens boast no outstanding heights, the greatest difference of level being no more than a few feet.

The small rock garden should not be more than three feet above the general level of the garden, nor sink more than two feet below it. You don't need to dig a mine shaft. A difference of five feet between highest and lowest points is ample — three may be enough.

The simple rules for construction may be stated thus:

(i) Use large flattish rocks as much as possible and lay them with their largest surface downwards, so that they stand on a firm base.

(ii) Place the biggest rocks at the bottom, the smallest at the top.

(iii) If some rocks slope in a certain direction, take care that *all* slope in the same direction, or at least that none slope in a contrary direction. Not that strata always slope in one direction only in a given area in nature; far from it. But we are not trying to copy nature; we are using our artistic perception to construct a rock garden, and it is likely to look, not more natural, but more harmonious if our rocks all dip the same way at the same slope.

(iv) Place smaller rocks on larger, narrower on wider, thinner on thicker, shorter on longer, and not vice versa. See that every rock is firmly seated. A rock which wobbles is not only a menace to the plants near by — and to you — it encourages mice, snails, beetles, and other uninvited guests. After planting a rock, push it from every side and make sure that it is firm in its bed.

(v) Don't allow cavities to develop between the rocks

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where filling-in has to be done; stop them at once with earth rammed hard.

(vi) Make as many nooks and crannies for selected plants as you can, especially on the sunny slope. Ledges also are useful, but take care that they do not overhang, and are not themselves overhung.

Remember that you bestride your rock garden like a Colossus and many of your best plants peep and peer between your legs, like pygmies, according to unhappy Cassius. In the alps, only too often do you find yourself staring up at plants well out of your reach. Not infrequently you meet with a plant growing on the skyline and see the sunlight shining through the flowers, an effect very difficult to reproduce in a small rock garden. Certain plants are doubled in value if they can be seen like this.

Not all the above rules can easily be followed if the only available stone is granite or similar igneous rock, whether waterworn or otherwise. If only bricks, flagstones, and rubble are to be had, it is even more difficult. Nevertheless, it is still possible to build a rock garden, using mainly soil stiffened here and there with rocks.

The stumps of trees, logs, flagstones, may all be discreetly used, if well built in. Of course, if you are reduced to using old bricks, the less seen of them the better. Only an end or a side or top need show, and these should soon be covered with quick-growing plants. Meanwhile they serve the dual purpose of giving shape to the rock garden, holding it together and as a heat absorber, which is often the chief role of naked rock.

The paradox of starting to build a rock mound by digging a hole is partly explained because a rock garden requires a foundation, but it also assists in making the ground uneven, or undulating — you need not fill up the entire hole again after you have dug it. Part at least will remain, if only a narrow alleyway reached by a few shallow steps. If good flat slabs can be provided for these, so much the better. If

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not, they can be of earth, revetted with logs if necessary.

There is another consideration in the setting up of rocks, namely, what may be called the psychological effect. Broad flat stones sloping gently downwards, or forming shallow steps, especially if tailing off to a chin like a new moon, suggest old age; not necessarily decay — any suggestion in that direction is easily corrected by a burst of vigorous plant life — but rather a mellow and serene maturity to be followed by a comfortable deliquescence into eternity. Rugged upright stones, bold towers, scarps and so on, the vertical being more in evidence than the horizontal, with narrow ridges and deep gullies, suggest just the opposite, that is to say, youth and vigour striving upwards, with all life in front of it.

But unless this loom of youth business is well done — and on a small scale this is difficult — it is apt to look ridiculous, like a wedding cake or, worse still, pathetic, like an old man in a boy's sailor suit. No amount of vegetation can altogether efface the comic effect of prickliness when the upright stone model rock garden goes wrong.

As regards soil, any good loam will do for growing the ordinary plants. It is important to realize that the rocks on a rock garden are there for a special purpose, which is not just display. In themselves they are neither ugly nor beautiful; it all depends upon what use is made of them. A heap of earth alone will provide *some* of the features of an alpine region — a sheltered north face, a sunny south aspect, for example; but the addition of rock introduces new principles. No doubt a handsome oolitic limestone looks better than bricks and slabs of cement; but don't lose your sense of proportion. The rock, or whatever material you use, has no value, apart from its main function, and if you, being the happy possessor of green fingers, can grow rock plants on your brick, cement, and earth rock garden better than your neighbour can on his Old Red Sandstone, your garden is better than his. Besides, why show any rock at all, in the

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summer, at any rate? The less rock exposed, the better the plants are growing. But perhaps you reply that in the alpine region bare rock is almost certain to be visible. I agree. I will go further and say that in the alpine regions of the Himalayas there is ten times as much rock exposed as there is covered by vegetation. So what? Do you still wish to imitate nature? Of course not. You want to grow plants on every square foot of your rock garden; aye, on every square inch.

So think of your rocks — or bricks — only in relation to the plants which grow on them, because of them, and not as separate and distinct items. They have no virtue apart from that, even if they cost you £5 a ton; though I admit — albeit grudgingly — that a warm creamy white limestone is intrinsically more handsome than the rubble the contractor left behind.

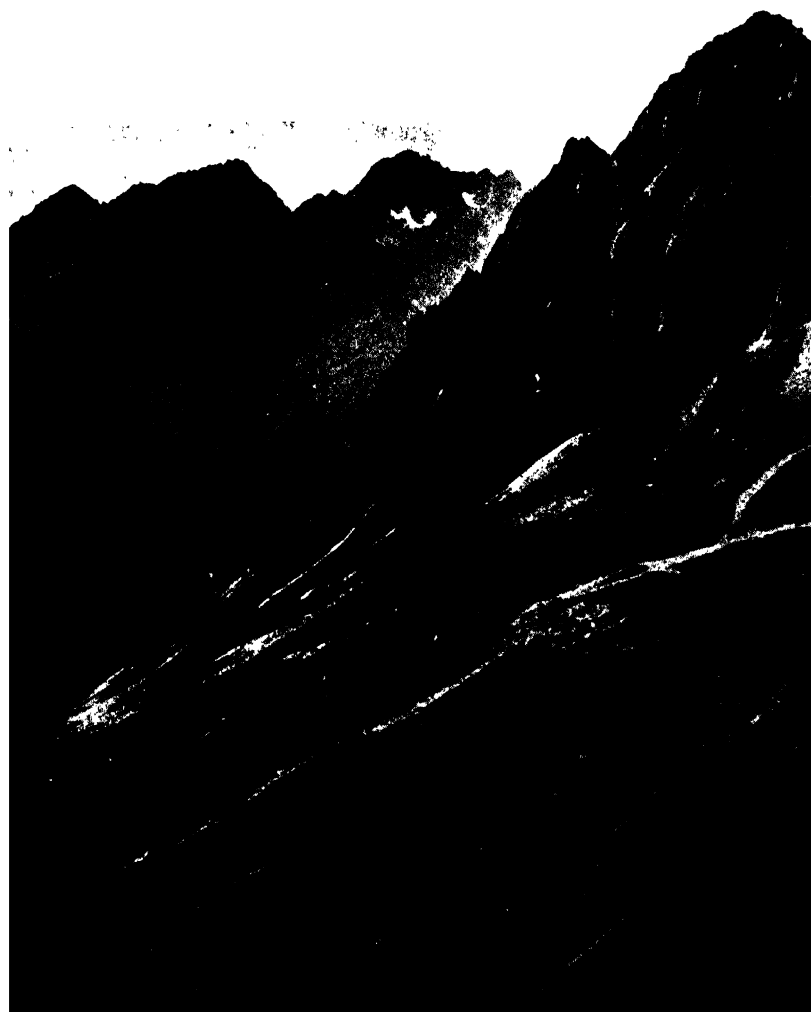
Nearly everyone who writes on rock gardening, tells you categorically to build with sandstone or limestone, but never, *never* under any circumstances to use bricks and mortar (which is largely lime anyhow), concrete (though it defies the weather admirably) or other artificial building material. But what *everybody* repeats is often wrong, generally foolish and always suspect. Because everybody says it, nobody questions it. A statement repeated parrot-wise by generation after generation becomes fossilized, retaining no spark of life. Change and decay in all around I see — except in these hoary shibboleths, rubbed smooth by the passage of time.

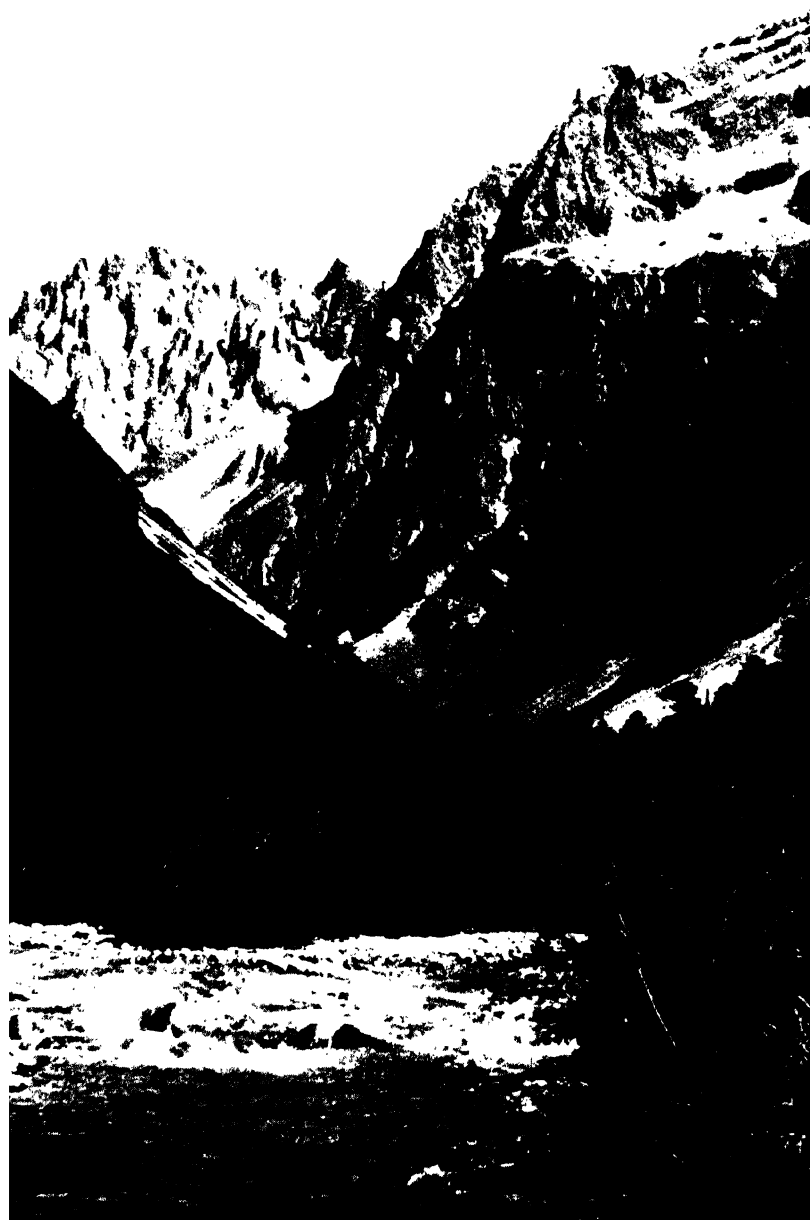
But to come down to earth. *If* the rocks are the most important part of the rock garden, and the plants a mere decorative effect; if you enjoy the sight of rocks rather than plants, and consider that the latter spoil the view; then I admit that a warm-weathered sandstone in sizable blocks, hacked out of the hillside by joint and bedding plane may be more pleasing than bricks, concrete, or water-worn stones vaguely described as niggling. But I don't think you

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do. And believing that the rocks in a rock garden, unlike little Victorian children, should be heard — or rather sensed — and not seen, I do not think it matters all that much what building material is used. My advice is, build with stratified rocks of any description if you can; with igneous rocks if you like; with bricks and mortar, or concrete, if you must. But anyhow, build. Only cinders are tabu.

We will now deal in greater detail with the construction of the Outcropping Rock Garden.





THE OUTCROP ROCK GARDEN

WHENEVER solid rock, whether stratified or not, appears at the earth's surface it is said to outcrop. The word is harmless; there is no suspicion of jargon about it, so we will use it here. Rocks may and do outcrop anywhere; in the hills, on the plains, under the sea. Mountains usually consist of a great variety of rocks outcropping all over the place. Perhaps the best example of an outcrop easily recognized by the layman is that often met with on the sea-shore between tide marks, where a mass of isolated rock appears completely surrounded by sand at low tide and by water at high tide.

It is firmly maintained throughout this book that the modern rock garden is neither a copy of a mountain scene nor a small-scale model. It has a separate existence, with an individuality of its own, and is no mere slavish imitation of anything else. Nevertheless, it reflects the hills, and has features in common with mountain scenery; hence a knowledge of what mountains are like in real life, how they are made, carved, and ornamented on the surface, and the rubbish disposed of, will help us to construct our rock garden on commonsense lines. In fact, such knowledge is essential to a proper understanding, not only of the supporting framework for plants, but of how the plants react to it.

Our purpose in building a rock garden is to make a home for displaced plants — not a concentration camp. A few simple rules must therefore be given, and the reasons for them understood. That is the chief difference between a rock garden and a rockery. A rockery follows no rules, is built to no design. It is a rubbish heap, or at best a pile of earth and stones, and so long as it is broader at the base than at the top, thus fulfilling the elementary principle of stable equilibrium, it stands up.

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But though even the best-built rock garden is not a miniature mountain, it may be a rock outcrop, or at least represent an outcrop, and therefore look natural; the more closely it resembles an outcrop the more natural it looks — if you regard that as of any importance.

In nature stratified rocks outcrop in a particular way which, if they have been roughly treated, may be very complicated. Unstratified, igneous or crystalline rocks out-

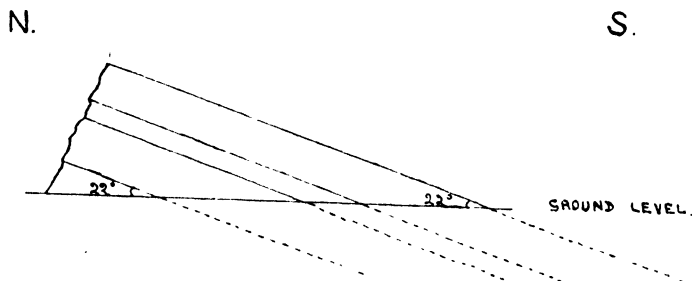


Fig. 1

Simple outcrop of sedimentary rock dipping south at 22° , and disappearing below ground level.

crop in quite a different way, often more simply. They also weather in a different way. The manner in which rocks weather depends as much on the type of climate as on the different kinds of rocks and their different textures. Limestone at 16,000 feet in China will not weather like the same kind of limestone on the Mediterranean coast. Let us, therefore, examine a typical outcrop of one of the commoner rocks such as chalk, limestone or sandstone. They are well exposed in the cliffs of England, in railway and road cuttings, in quarries, and many other places, and we can hardly fail to notice that the beds or strata nearly always slant in a particular direction, gently or steeply; they are rarely horizontal, that is to say parallel to the ground, at least over large areas. The geologist's word for this slant is dip; strata are said to dip north or south, or whatever the direction may be, at a certain

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angle, which is the steepest angle the strata make with the level ground surface, or with the horizon. Strata are always laid down horizontally to start with, and if they are subsequently tilted up until they actually stand on edge, they dip at 90° ; and though they may be turned right over on to their backs ('reversed') they cannot dip at more than 90° .

Suppose they dip at 22° to the south, as in Fig. 1. Then obviously they must disappear beneath the surface somewhere. Generally one kind of rock covers a considerable area,

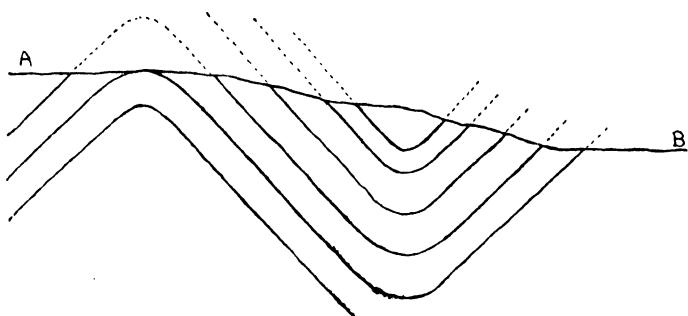


Fig. 2

Anticline and Syncline. Strata dipping away from each other at 45° . The dotted lines show the parts worn away to give the gentle slope AB, owing to the shaving off of the tops of the anticlines.

and sometimes it may be found to dip in opposite directions some distance apart. This means that the strata have been bent into a wave form, perhaps a series of waves, trough succeeding crest or, as a geologist would say, syncline and anticline. Quite often, however, the crest of the wave or anticline has been shaved off leaving a level surface (Fig. 2).

This is almost all the geology concerning stratified rocks we need to know in order to construct our outcrop rock garden on commonsense lines.

Igneous or crystalline rock behaves rather differently. To begin with it outcrops in irregular masses without stratification or dip. Sometimes the outcrops look like domes or pillars or even huge fangs, often with a comparatively smooth

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surface; or it may just be in shapeless lumps. If we are compelled, for want of something better, to use this type of rock, or if, as not seldom happens, it outcrops in our garden naturally, we must make the best of a bad job. But it is much harder to work with than most stratified rocks.

The tardy weathering, and indifferent products derived from crystalline rocks, however, need not worry us. Mountains must make their own soil, and that may take years; we provide the rock garden with the ready-made article. From what has been said about the outcropping of stratified rocks three points emerge, so far as building a rock garden is concerned.

First, we should use one kind of rock throughout. It may be any variety of sandstone, limestone, shale, or even slate (which is semi-crystalline); in fact, any stratified rock which is not too crumbly. But whatever it is, it should be uniform throughout the rock garden. To build one half of limestone and the other half of sandstone is a blunder, though with the small garden we are considering here this is not likely to happen; the material won't run to it.

Secondly, our rocks should all slant or dip in one direction. To achieve this we should place them, not flat, but sloping, and the slope should be the same in every part of the garden, unless we wish to make an anticline; there is no reason why we should not incorporate an anticline, provided we understand what an anticline is. But it has no particular advantage.

Alternatively, we can get our dip by building up the slope with earth and laying the rocks flat on top, layer by layer. With only small stones at our disposal this is the best way to do it.

However, we are at liberty to lay all our rocks horizontal, if we prefer them to be horizontal, or if our building material does not lend itself to a regular dip. In this way something like a pyramid may be built up, though this is not so effective as an ordinary dip arrangement. The advantage of making

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the strata dip at a comparatively low angle to the south or west is to provide the longest possible sunny slope, together with a few sheltered pockets on the north face for plants which demand shade. The north slope can be made gentle too, unless you insist on shade.

I have seen it stated in books on rock gardening that a slope to the south is warmer because the sun strikes the slope vertically, or almost so. This, of course, is a delusion. It is true that if the midday sun is, say, 45° above the horizon, and the rock garden slopes south at 45° , the rays appear to meet the slope at 90° , that is at right angles. If this slope is

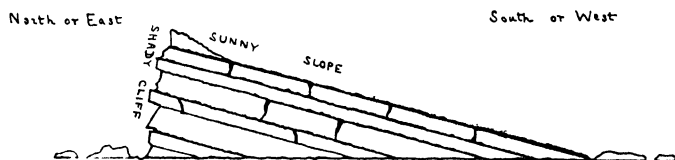


Fig. 3

Side view of a small outcrop 24 ft. long, 3 ft. high at the north end. (Vertical scale equals twice horizontal.) Rock plants to be grown in the crevices between rocks. Ledges can be made on this face by setting back each layer of rocks as they are built up.

any warmer than the north slope, however, it is only because the sun shines on it longer, and not because the rays seem to strike it at a higher angle. The fallacy lies in supposing that the higher temperature is caused by the angle at which the sun's rays meet the surface; whereas it is the angle at which they pass through the *earth's outer envelope*, that is to say the atmosphere, which alone has any significance. No amount of juggling with the earth's surface will alter the fact that if the sun is 45° above the horizon, its rays pass diagonally through the atmosphere, and therefore through a much thicker layer than if it was vertically overhead.

The third point is the obvious and oft-repeated one that the biggest rocks must, for the sake of stability, form the base of the structure, with the smaller ones above; otherwise the whole becomes top-heavy.

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Suppose then we wish to construct a rock garden some 24 ft. long by 12 ft. wide and 3 ft. high, thinning to 4 ft. wide and ground level at the south end, which is a useful size for the small outcrop type. We would set about it in this way. Begin by excavating the whole area marked out to a depth of one foot. (This will be quite a job of work in itself!) If the soil is light and sandy, or if it consists mainly of gravel, we need do nothing more about draining it; it is well drained already. We may, however, have to do something about enriching it with leaf mould or humus. But not necessarily. Many alpine plants thrive in a rather poor soil, and many gardeners forget this and overfeed their plants. The fact that some plants respond by growing twice as big in captivity as they do in the Alps is no proof that they are twice as happy, any more than a goose ear-marked for *pâté de foie gras*, with a liver twice the normal size, is any happier for its doubled storage capacity. The important thing is that the soil shall be thoroughly well drained.

If on the other hand we find ourselves on a heavy clay soil, we shall have to dig deeper to start with, (perhaps to a depth of two or even three feet), and fill in our foundation with bits of broken pot, gravel, or granite chips to ensure good drainage. Nor can we use the clay dug out to build up the rockwork, except in the form of bricks in place of rocks; for the superstructure too must be well drained. We must use a light sandy loam for filling in; that is to say, the soil in which the plants will grow; for this above all must be well drained.

The foundations are now dug and we can start work on the upper story, the real rockwork on which our plants are to grow, the finished article to be, as it were, an outcrop of some recognizable rock — if possible.

Before we begin, let us draw a scale section and plan of the proposed structure (Figs. 3 and 4). There is room for only a single narrow path less than a foot wide, which need not continue through the lowland at the base of the outcrop; it can stop half way, and we can finish the journey over the top

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of the ridge on stepping stones, which must be perfectly firm. This saves valuable space, for plants, unlike cockroaches, do not mind if you step on them — at least they return to normal more readily.

We had better bevel off the edges of the pit and then fill in those parts we intend to raise above ground level with a foundation mixture of loam, gravel, and brick-bats; the drain-

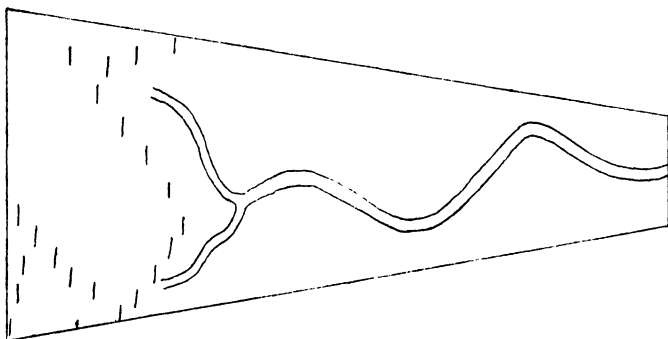


Fig. 4

Ground plan of outcrop rock garden 24 ft. long, 12 ft. at the north end, narrowing to 4 ft. at the south end. The narrow end may be curved or straight, pointed or truncated

The path follows a trench between two built-up walls from ground level to about 2 ft. below ground level and 4 ft. below the top of the rockwork; it then crosses the rockwork by means of stepping stones.

age must be as nearly perfect as possible — at least there must be no suspicion of stagnant water anywhere. The soil for our plants need not differ greatly from that described; a somewhat hungry loam is to be preferred. Most alpine and many rock plants from high altitudes prefer it so. We can always contrive side-pockets stuffed with rich foods for those plants we find ourselves unable to keep unless we pamper them. When the filling in has about reached the original ground level, we must start building in our rocks. From a glance at Fig. 1 it is obvious that, in order to make our rocks appear to dip, recourse must be had to a small deception. In nature a block of Earth's crust several miles long and equally

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wide is actually displaced and tilted. All we can do is to tilt a few cubic feet. If we happen to possess rocks several yards in length we can bury their ends in the ground at the required angle. But more likely we have only a miscellaneous assortment of small rocks of many shapes and sizes which do not lend themselves to dip; so we shall have to raise a sloping foundation of earth, and plant the rocks on it layer by layer. Having done this, see that the largest and heaviest rocks are placed at the base and well firmed in. They need not, and in fact should not, be touching one another, but any gaps between them must be filled in solidly with loam. On no account must your garden be like a loaf of bread, that is to say aerated; at least not visibly.

Now, having put down a layer of stones, cover them with earth, the same light sandy loam, tamping it firmly between the stones, which should be arranged at the edges of the slope if there are not enough to cover the whole. The soil layer must be several inches thick, but its exact thickness depends on how thick your seams are; the soil may spill over and pile up round the outside of the seam till no more than the edges are exposed, particularly of the bottom seam. On top of the soil layer, which of course slopes at the same angle as the seam beneath it, place another layer of stones the same size as the lowest layer, or rather smaller, keeping the same dip and stopping short before you reach the lower end of the slope, so as to leave a good step. When the outcrop has been built up several feet above ground level in this way, stone seams alternating with soil, it is time to call a halt; we can now review the position once more. If it looks too symmetrical, like the Great Wall of China or Wall Street, a more negligent note may be struck. The unexpected addition of a crag or tower or a massive boulder, in fact anything which breaks the set line, will work wonders.

At this stage smaller and more angular stones may be used to put the finishing touches; not stuck in anyhow like currants in a rock cake, but properly combined with the main features.

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They may be strewn at the base of the cliff, or made to form stepping stones to higher things.

Finally, you can devise a few nooks and cosy corners, where favourite plants can nestle, thrusting their roots deep between the stones; while the more robust are assigned to slopes and ledges, crevices and sunkissed rocks, where they can lap up heat to their hearts' content and strain the goodness out of the water as it soaks quickly past their roots. When all this and more has been done, our framework may be counted complete.

Before actually putting in such plants as you propose to cultivate, make a list of them and assign a place for each. Try to visualize the scene a year or two years later. You will, of course, allow plenty of room for each plant to grow and spread; but the rates at which they will do this will not be the same for all. Some plants grow very slowly, others quickly, but all grow as long as they are alive. Some grow up and some grow sideways, and it is these spreaders and carpeters that you want to court, as they will gradually cover your outcrop and make of it a rock garden.

If we had a good supply of flags such as are used to pave our sidewalks, it would be a comparatively simple matter to build an outcrop like that just described, with a natural-looking dip and escarpment, with ledges, crannies, chimneys, and other hide-outs for our plants, the whole well tucked into the local landscape. Unfortunately the chances of our being able to acquire such suitable material in bulk are not bright. If you live in the hills you can, of course, make your rock garden in the living rock; if both the rocks and the plants are living your rock garden really is a natural one!

If not, however, (and this book is intended mainly for those who live in the suburbs) you may have to *buy* your rock, though that's cheating. Possibly, if you have a car, you might steal it from a nearby quarry. The only alternative is to use building material.

If you have the money to spare, there is no reason why you

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should not buy rock (I don't recommend you to buy your rock garden), only don't be surprised if the bill for a few tons of rock brought from the other side of England is a staggering one. Moving the crust of the earth around is apt to be an expensive business.

Luxury or not, you remember that man does not live by bread alone, however necessary bread may be, and you decide to take rock gardening so seriously as to buy a ton of good quality rock as a foundation. At the back of your mind may be the unexpressed ambition, some day when you are more experienced, to cultivate new and rare alpine, possibly some plant which has never been in cultivation before. It is a worthy ambition.

If you do buy rock, at least be sure it is suitable for growing plants. Although you will often hear it said that sandstone or limestone are the best rocks for the purpose, we must be quite clear what kind of sandstone or limestone we mean; the remark in fact needs qualification. For in the first place sandstone is derived from granite and other igneous rocks containing quartz, and in the second place it occurs in almost every geological horizon from pre-Cambrian to Recent, and varies accordingly. Unless, therefore, we are a little more precise, we may find ourselves with a ton of pre-Cambrian quartzite on our hands; and *that* kind of sandstone is as hard as iron. Alternatively we might be landed with some friable Tertiary sandstone which would disintegrate at a touch. Neither would be satisfactory. Most of the Palaeozoic sandstones, such as Carboniferous grits, Old Red Sandstone and the like, are tough but suitable; perhaps Mesozoic sandstones are better, though they are much less abundant than the older strata. However, so long as we buy rock for the rock garden through a reliable nurseryman, we are not likely to get unsuitable material.

Much the same is true of limestone, which is one of the commonest types of rock met with in Great Britain. Only two counties in England, Cheshire and Cornwall, produce none,

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so that if you decide to make a limestone outcrop you can often obtain stone locally. Unfortunately, for much of England the limestone is in the form of chalk, which is not the best form of limestone for the rock garden. There are Palaeozoic, Mesozoic, and Tertiary limestones, and they vary much in durability, from hard Carboniferous and Magnesian limestone to soft chalk and rag. The medium limestones are probably the best. Oolite, Portland building stone, and Lias are all good; Coral rag is too soft, Wenlock too hard. But weathering is not the most important quality from our point of view. In the mountains, plants cannot take root until the rock has weathered to some extent and yielded soil. But we are not going to wait until the rocks are broken down to form soil by natural process — it might require years. We are going to supply ready-made soil to our plants, and whether the rocks break down slowly or quickly is not a matter of great importance, nor does it matter if the soil to which they give rise is poor. We give our overseas plants free board and lodging. Probably the most important quality of our rock is its capacity to absorb and radiate heat.

Mines, quarries, and gravel pits are all too familiar in England nowadays, and while a chalk quarry is not altogether unsightly, and in the hands of a skilled gardener can be transformed, a gravel pit is not only hideous in itself, but when worked out leaves the ground almost useless for any other purpose. Many of the London area gravel pits are abandoned with up to 20 feet of water in them; though these attract less attention than the equally ugly coal and slate pits. True, the majority of these mineral workings are concentrated in the so called 'axial belt' which stretches in a broad north-west south-east band diagonally across England from London and the Thames estuary to the Lancashire coast; but this does not include all the coal-mining areas. Anything the gardener can do to bring back colour and sweetness to even a few square yards of the ravished earth within this 'coffin' is a good deed. Abandoned workings can sometimes be

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afforested, or converted into rock gardens on a big scale. But the gravel pits round London, according to Mr. S. H. Beaver, offer the greatest problem to the planner. Gardeners, and particularly rock gardeners, are going to play a big part in bringing England back to sanity.

On a well planned and properly constructed rock garden, most of the rocks will be hidden beneath a crust of vegetation. Plants and rocks must blend together; they may infiltrate here and there into one another's territory, but eventually visible rock will be exceptional. Only in the very early stages and during the winter, when plants contract or retire underground, need it become conspicuous. Although no doubt some kinds of rock are more beautiful than others, and almost any natural rock is more beautiful than bricks and cement, indelicate exposure of even the most alluring rock has, in the rock garden, little to recommend it. The less it is exposed the better, you may be sure, your plants are growing and the more of them is there room for. And while I do not wish to imply that rocks are definitely ugly, they can but rarely lay claim to any beauty other than a beauty of line. The best rocks are no more than neutral in colour, except perhaps in Colorado. In the mountains these qualities mean something; but in the restricted space of the rock garden they have no significance — the scale is too small. That rock garden is therefore the most effective in which rocks are hinted at by a turbulence in the coloured tide of flowers which flows over them, as submerged rocks are indicated in the river by ripples on the surface. So it would seem foolish to spend more money on rocks than you are prepared to spend on plants; although this is not likely to happen, because the cost of the rocks is a capital charge, while the purchase of plants is, to the enthusiast at least, a recurring expense.

But suppose that, like the majority of us, you feel that to buy rock is an unjustifiable expense; nor do you live in the hills with a quarry on your doorstep so to speak. And suppose further, again like many of us, you are determined in

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spite of these handicaps — or possibly because of them — to make a rock garden. What then? Well, then you must make use of the rubble left over by the builders — old bricks, any stones you can lay your hands on whatever their shape or origin, whether smooth and rounded in the river or pounded on the sea-shore, antique tombstones, concrete steps or paving sets; even old tree stumps and logs, as used so successfully in the Royal Botanic Gardens, Edinburgh — though here the object is to grow certain difficult plants. The rootery is separate from the rock garden.

Now, of course, it is more than ever necessary to conceal our ersatz rocks, for they are frankly not beautiful even in line or colour; a mere collection of miscellaneous masonry and road metal, which is bound together in defiance of every rule of construction. Moreover, they are more difficult to hide by reason of their irregular size and shape and the shifts to which we are put to weld them into coherent form. No doubt, also, this ersatz rockwork is less fitted to perform its true function, which is not just that of a framework supporting a heap of earth and bringing small plants closer to eye level, but is also and more particularly concerned with the storing up and radiation of heat, quick drainage, and perhaps other functions connected with the well-being of plants, especially their invisible parts. But that can't be helped.

Many experienced rock gardeners advocate the use of stone horse troughs — nowadays replaced by petrol pumps in our urban areas — to eke out the small rock garden; and controversy not unnaturally arises as to their beauty or otherwise. Stone troughs are all very well in their way, but they are mere containers — nutshell gardening as it were. The first question to ask is not: are they beautiful? but, are they expedient? The question of their aesthetic claim is in this connection irrelevant. The verdict, I think, must be that they are not substitutes for rocks, because they cannot perform the functions of rocks.

I have heard some gardeners say that you can kill more

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alpines and rock plants in less time by immersing them in horse troughs than in any other way. I have not tried, but many people are successful. Cattle troughs are unnatural in the sense that you do not find them scattered about in the mountains; but you do find something not unlike them, namely potholes or *moulins*, that is mills, so familiar in glaciated mountain regions. These are deep, more or less circular holes scoured in the solid rock by eddies which for ages have whirled stones round and round against the bottom, thereby grinding out these deep wells. I cannot say that I have ever seen plants growing in a pothole; but since a disused pothole would generally be filled with earth and stones it would not be recognized as a pothole; and unless it *was* filled in, plants would not be likely to grow in it, any more than they would grow at the bottom of an ordinary well.

But no doubt cattle troughs have their uses if your chief aim is to cultivate particular plants; though sometimes it may be difficult to assimilate them into the rock garden. Even this I believe has been successfully done by Dr. M. Amsler and others.

If real stone is not to be had by hook or by crook there is no reason why you should not use artificial stone, that is to say, blocks of concrete. One great advantage of concrete is that you can make blocks to order of any size, shape, and thickness you like. It will not weather like natural rock, but you mustn't expect too much! No doubt artificial silk, rubber, and coffee leave something to be desired!

With concrete blocks it is easy to arrange dip to suit yourself. So by all means use artificial rocks; but don't decorate them with artificial plants. Concrete may not be as beautiful when used in the rock garden as it is when used to build temples, palaces, and bridges; but neither is it so conspicuous. In fact, in the rock garden in summer it should not be visible at all, or barely visible; and 'barely' here is the *mot juste*.

But if stone troughs do not perform the functions of rocks

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they perform other functions equally useful. If, for example, your garden is on chalk, and if for any reason you want to grow rhododendrons, you can fill a trough with leaf mould and sand, incorporate it with the rocks, and grow all the dwarf rhododendrons you have a mind to, so long as you keep chalk out of your trough. In this way, but on raised timber platforms instead of in stone troughs, Colonel F. C. Stern has grown many dwarf rhododendrons in his old chalk-pit garden in Sussex.

WHAT SHALL I GROW?

'Now that my rock garden is built, what shall I grow in it?' A fair question, even though there is no lack of choice; or perhaps *because* there is no lack of choice, *embarras de richesse* making it hard to choose.

Well, if you don't know, there are lots of people who will be only too glad to tell you, though I am not one of them. It is their business, and their business, no doubt, is also their pleasure. They may be slightly prejudiced, but most of us have prejudices. You can make allowance for that.

The people to whom I refer grow alpine and rock plants for sale. They are nurserymen, and of course they know quite a lot about their wares, though probably not as much as they pretend they do.

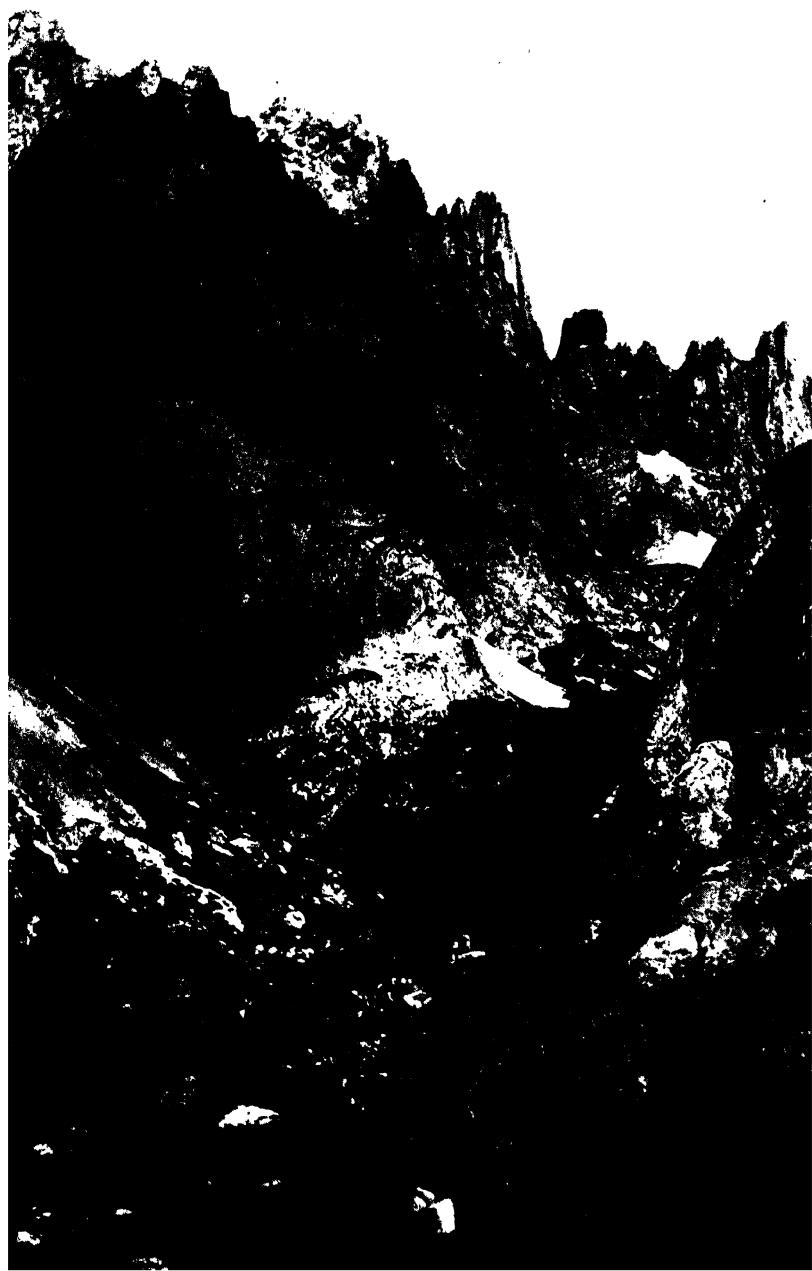
All you have to do then is to 'write for catalogue'. Any good firm will supply you with one, free gratis, and be glad to do so, scented business. Armed with a catalogue you can make your own choice from a long alphabetical list of names.

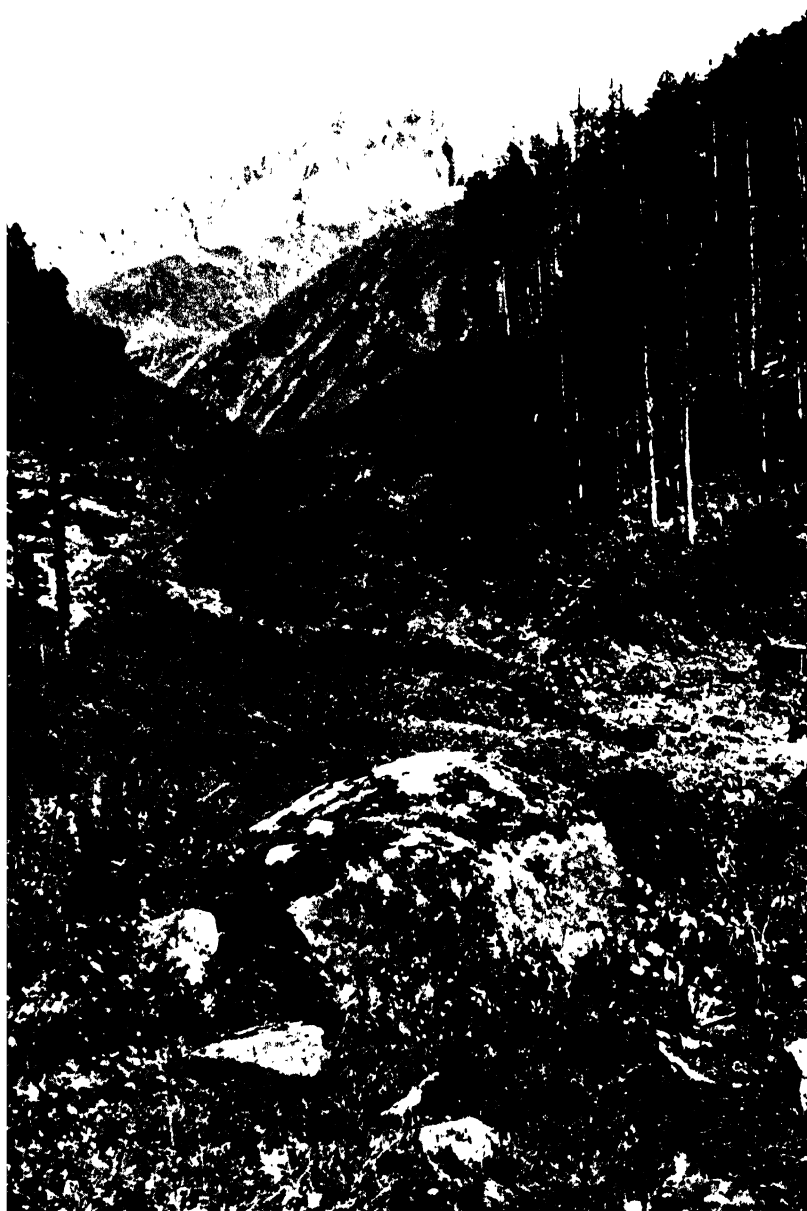
That is one way. It is not the best way, but as a start it has much to recommend it.

But descriptions of plants as met with in nursery catalogues, however excellent, suffer from two common ailments:

- (i) they are too brief;
- (ii) they are too flattering.

Perhaps the greater includes the less. All the plants listed — and they are likely to be several hundred — can hardly be equally attractive, equally free flowering, equally easy, desirable, indispensable, resistant and of such all round excellence. Yet the nurseryman is not likely to grow plants he can't sell, and in order to sell what to most people is only a name, he must give it a good write-up. Everything he grows he must try by hook or by crook, bell, book or candle, to sell — other-





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wise it is useless for him to grow it. He is a business man first.

Of course tastes differ. What excites one person, may leave another stone cold. Nevertheless, few qualified to judge will dispute whether a particular plant is in the first or second class.

So also do purses differ; and while one may be willing to pay a guinea for a plant, another may be unwilling to pay more than sixpence.

Yet it would never do for the nurseryman to lavish a guinea's worth of praise on his guinea plants and only a shilling's worth on his shilling plants. *All* his geese are swans, or at least cygnets. The shilling plant must be written up in such a way as to sound as desirable and indispensable as the guinea plant — most nurserymen earn their bread-and-butter with their low-priced plants.

As a matter of fact it very often is. Generally speaking, scarcity value, not beauty, accounts for the high prices of plants. In certain specialized groups, the rank and file of which are in a popular demand, where quality is everything and a new variety only to be achieved by long and patient work — for example, a newer and better daffodil — scarcity value may last for many years. People will pay £30 or £40 for a single new daffodil bulb. Thousands of enthusiasts grow daffodils, and millions of daffodils are grown; but there may be only a few dozen bulbs of a particular new colour, size or shape in the whole world.

But with the nurseryman's ordinary rock garden plants raised from seed, remember that if it has a scarcity value this year, it will — if it is a good 'doer' — be much less scarce next year, and so will come down in price. Therefore be patient and wait a year.

When studying catalogues don't forget to discount some of the nurseryman's enthusiasms — say 25 per cent — and temper his superlatives with wisdom. If the plants are just so many unfamiliar names to you, nevertheless read the

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blurbs carefully, and try to picture them in your mind's eye. If the catalogue is illustrated with photographs, as many are, so much the better; the camera cannot lie, not more than 50 per cent at any rate. Coloured pictures like those shown on annual seed packets may be the dreams of incurable idealists, but they are undoubtedly a help. There is, however, hardly a rock garden plant obtainable from a nurseryman of which you cannot find a picture if you search the gardening papers and horticultural literature generally. Try the library of the Royal Horticultural Society in Vincent Square, London.

But there is really no excuse why this second-hand information about any plant should be the sum total of your knowledge concerning it. Apart from books and catalogues and the gardening Press, there are three sources of knowledge open to you, all of which deal with the genuine article itself, and not with a more or less tendentious description of it, namely:

- (i) gardens;
- (ii) flower shows;
- (iii) holidays in the mountains.

You are strongly recommended to indulge yourself in all of them. The best way to get to know plants is to see them growing, and this may be done by visiting a friend's garden, or a botanic garden, by visits to flower shows, or by discovering them for yourself in the wilds — this last is the best way of all, combining a holiday with a definite object.

Any of these methods will help to make you familiar with real live plants, so that you will quickly develop fads of your own and pick winners. You are certain to want some plants in your garden more than others; you may in course of time want far more than you have room for, but of course you are not bound to keep the same plants for ever. They will see to it that you don't, by dying. Then you can try something else that appeals to you.

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For the real enthusiast there is still one further source of information open to him, namely, a botanical museum, usually called an herbarium. Such herbariums are attached to our national botanical gardens, as well as to our museums, universities, and other institutes of learning.

In an herbarium you can examine dried and pressed specimens of the plants which interest you — vegetable mummies. They are not as a rule particularly beautiful, they tell you nothing about cultivation, and they bear no more resemblance to the living plant than a royal mummy bears to a Queen of Egypt. Their appeal is to the botanist rather than to the gardener; but in the more rarefied atmosphere of higher horticulture, the herbarium is the final court of appeal in questions of identification.

Let us discuss the three sources of knowledge in sequence.

(i) Assuming that you have no profound knowledge of alpenes and cannot just sit down and scribble off a list of plant names such that no rock garden is complete without them, the best way to get to know and like plants is to visit other rock gardens. Start with the national botanical gardens, where you will find every rock plant labelled with its probably correct name and home of origin. You can profitably spend a week exploring the rock garden at Kew during each of the four seasons and will learn that even in winter you can have colour. Visit Edinburgh and its famous rock garden. There are even rock gardens in some of our public parks, where nowadays all plants are labelled.

However, there are, or were recently, privately owned rock gardens which beat even the national collections. Those who believe in private enterprise will note this well — their opponents may say it is a form of luxury, of course; those who think that the nation ought to have the finest garden in the country, if not in the world, will also note it. So, after visiting Kew and Edinburgh, Wisley, which is the Royal Horticultural Society's garden in Surrey, Oxford and Cambridge, which also have botanical gardens, and any

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other public gardens you can discover, start on your neighbours.

You may have a friend who is a keen rock gardener: if so he will not be backward in showing you round, describing his treasures and telling you what to grow and how to grow it. He may babble Latin names, an amiable weakness of catalogue gardeners, but don't let that discourage you.

In the summer, private gardens open to the public on certain days on payment of a shilling in aid of Queen Alexandra's Nursing Association, include all the finest gardens in the country. There are several in every county, so there is probably at least one not far from where you live. If you go on a crowded day, it is likely that, shuffling along in a queue, you won't have much chance to dally. It will be 'keep moving, please', and 'move on, please', all the time. You are just one of a herd. Further, you may be dazzled and bewildered by the cascades of flowers, the blitz of colour bursting like shells from crevice and crag in some almost life-size rock garden, so that you are confused. Nevertheless, even under these rather alarming conditions, you should be able to pick out and concentrate on a few plants which make a particular appeal to you, write down their names, and learn something about them. At least you have now seen them growing.

On the whole, however, visiting a big show place on a fine summer's day, unless by private invitation, is not the most satisfactory method of choosing plants for one's own modest rock garden. But it does give one some idea of what can be done, of the enormous variety of plants with their limitless combinations, and of what a rock garden should look like.

Remember you are not stocking a botanical garden. Your object is to produce a work of art, something which will combine life and form and colour at every season of the year. This can be done by making a judicious selection of fifty or a hundred different plants out of the several thousand species and varieties available in Britain to-day.

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(ii) Another and perhaps better way of becoming acquainted with live plants, better certainly from the point of view of learning to know them, is to visit flower shows, particularly the Royal Horticultural Society's fortnightly shows in London. Here you can run the nurseryman to his lair and see his wares for yourself, comparing them with the descriptions in his catalogue. All his blarney is now exposed, and no doubt you will be agreeably surprised to find how closely his opinion coincides with your own — or more reasonably, perhaps, how closely *you* agree with *him*.

For he has his best plants set out in pots or on a miniature table rock garden — the primulas and saxifrages and fritillaries, the snowdrops, crocuses and tiny daffodils, the irises and grape hyacinths, and tulips, all miniature like the rocks, but living, breathing plants just the same. They are very trim. The whole design is neat and colourful, and this is exactly what you aim to make your rock garden look like. How vivid are the clumps of dwarf iris, their three-pronged flowers rising just above the dark earth, the modest wild daffies, their yellow skirts bellying, the rows of nodding anemones, the plump clustered grape hyacinths, and many more! If it is the beginning of spring, say the first week of March (which the calendar calls winter, dividing the seasons unseasonably according to the equinox, though we know by centuries of experience that March, April and May are spring just as December, January and February are winter), if it is the first week of March there will be dwarf irises, anemones, early primroses and many other flowers. They have probably been raised under glass, and so have escaped the battering February rains and boisterous winds. It does not matter. They are, as the nurseryman says, quite hardy, only with you they will flower a little later (unless, of course, you come from the mild West Country).

After several visits to the shows you ought to have no difficulty in selecting the plants you want for your own particular rock garden, or some of them. Choose good plants

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of course, the best you can afford, and always select the best form. But begin with easy ones, plants which grow themselves as it were: aubrietias and lithospermum, house-leeks (*Sempervivum*), saxifrages and stonecrops, which look well on any rock garden, anemones and so on. Take the nurseryman into your confidence and ask his advice, telling him how dry your soil gets in summer, and about that lamentable east wind; he won't let you down, and he has had a lot of experience. With the miniature rock garden before your eyes you can make up a nice little collection to start your garden.

(iii) I have left to the last the most fascinating and romantic of all ways of stocking your first rock garden. Visits to flower shows will give you some idea of the range of plants on the market and what they look like when growing, and you can buy live plants — or, more accurately, order them; the nurseryman will send them to you by post later, and all you have to do is to plant them either in pots or, better still, straight on the rock garden. Visits to private estates will make you acquainted with types of rock gardens, and with a great variety of plants and combinations of plants, and of what can be done with these. But for sheer satisfaction there is nothing to touch collecting your own plants in the field, and stocking your rock garden with the treasure you have yourself discovered. Be a plant collector, if only for a short holiday.

Begin in Britain: in England, in the Welsh hills, in the Scottish Highlands. What could be more alluring, more exciting, more satisfying than finding the plants one would like to have growing in one's own garden! Dig up the plants you want, carefully, lovingly, at the end of your stay and carry them home with you. More patiently, if more certainly, collect seeds, and sow them when you get back. But the seeds must be quite ripe — and that means the plants won't be in flower, and if they are not in flower you probably won't recognize, or even see them, and anyhow won't know whether

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you want them or not. Thus there are certain inherent difficulties in seed collecting. This particular difficulty can be got over by visiting the locality a second time at a different season, say spring and autumn.

But if you dig up wild plants — and don't forget that in some places this is an offence — never dig up more than you really want and can conveniently handle. It is no doubt more criminal to pick large bunches of flowers, only to cast them aside as too heavy a burden to carry home, than to remove a few favourite plants which will be cared for and increased. Still, it is a pity to dig up plants you can't use. It is wrong to do anything which will endanger the very existence of a beautiful wild flower — sting-nettles, docks, and such-like plants capable of resisting all our efforts at extermination are not here regarded as beautiful wild flowers. They are the vermin of the vegetable kingdom.

After Great Britain, where of course we find scores of wild flowers which would grace any rock garden anywhere, there is Switzerland, perhaps the best organized mountainous country in the world. Follow the man from Cook's. The Alps — *the* alps — will teach us a great deal which will be useful to us further afield. Beyond that lie Norway, the Pyrenees, the Balearic Islands, Sicily, the Carpathians, the Atlas, Crete, the Balkan mountains, the Caucasus. Still further away, and no less the homes of hardy alpine and rock plants, are places like Persia, which is mainly desert, but large enough to contain also fertile mountains and plateaus, the Allegheny mountains, the Rockies, the Mexican plateau, the Andes, Kashmir, Japan, Tasmania, New Zealand — we have already reached the Antipodes and in the matter of distance can go no further.

In all of these places lurk rare and perhaps new — certainly much wanted — rock plants, and almost all of them, even the most distant, are accessible by modern means of transport. At least we can quickly reach the outskirts.

However, it is not till we penetrate beyond the outskirts,

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into the very heart of the mountains, to places at present only reached on foot, that the best is obtainable. May they long remain inviolate, for the best should only be obtainable through hardship and sacrifice, even if it is only sacrifice of comfort. Further and further away are the places where our plants are found; but the amateur may nevertheless enjoy all the thrill of the plant collector discovering new species by going no further than the Welsh hills, or Scotland. In the course of his travels in search of plants, he will soon learn to know them in their natural haunts, and to love them.

And so, in reply to the question, 'what shall I grow?' I say: 'grow what pleases you most — but first learn to *know* a few plants, by reading about them; better still by seeing them in gardens and at flower shows; best of all, a far far better way, by seeing them for yourself as they grow in their own homes, the common people of the plant world.' As to the motives which incline one to choose favourite flowers — are they not personal and private? Beauty? familiarity? association with happy memories? ease of culture? (an important consideration these days, especially to the beginner), suitability? cost?

Less likely to influence the beginner is novelty, but it is a powerful motive which influences many an experienced amateur, and all nurserymen. Novelty means something to the nurseryman just because it has an almost universal appeal. It is like love at first sight — and like love at first sight it does not always survive second sight.

There is one other point worth considering before you make your final choice. Plants vary greatly in their period of flowering. A few flower nearly all the year round, or twice over, but most are finished within a month or two, and may not be particularly handsome during the rest of the year. Even the most beautiful flower, which displays itself for one month and does nothing at all for the remaining eleven, pays a poor rent for its room. It is hardly economic

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to keep it, unless it is evergreen. The plant to go for is the one which flowers over three or four months, or the one whose pleasant spring or summer flowers are followed by brightly coloured berries, or by autumn tinted foliage. The lovely *Dryas octopetala*, for example, flowers spring and autumn, and its fruits are almost as bewitching as its flowers. That is the type of plant to seek.

Of course, having planted fifty species of plants in your new rock garden and filled it completely, leaving only a minimum of space for each to wax fat, there is no reason why you should stick rigidly to that pattern for ever. No reason why you should, and no likelihood that you will either. After a few years a census would reveal considerable changes of population and of status. Some will have died in the last drought, others in the great spring frost. Newcomers, given by friends, bought from a nurseryman after being admired at a show, or collected on holiday, have joined the party. The mixture is no longer as before. This is one of the subtle joys of gardening, this constant change implying growth. With a little care, even the knavish tricks of our climate should not irreparably damage your new rock garden. But until you really know something about gardening and the ways of the vegetable kingdom, it is only common sense to stick to easily grown plants which can be guaranteed to take care of themselves, and weather most meteorological crises; thus you avoid crippling losses and bitter disappointments at the outset. Later on you will become hardened.

Any good nurseryman will tell you what are the easiest two dozen rock plants it is worth your while to grow. At least he will give you *his* version. There are hundreds of them. My own choice would be selected from the following, nearly all of them continental European plants. Nevertheless, anyone with imagination could, by taking a very little trouble, make a rock garden of British plants only which for eight months in the year might be made to look very beautiful.

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My beginner's collection would be selected from these:

Agapanthus Mooreanus.

Androsace helvetica.

Anemone appenina. One must grow anemones.

Anemone blanda.

Anemone Pulsatilla.

Antirrhinum ansarina.

Arabis albida. Beware of getting *A. albida* fl. pl.

Arenaria balaerica. Invasive if given its head.

Arenaria montana.

Asperula suberosa.

Astilbe glaberrima saxosa.

Aubrietia deltoidea var. Dr. Mules; and other colour varieties according to taste.

Calceolaria polyrrhiza.

Campanula carpatica; and varieties galore.

Campanula cochleariifolia. Commonly known as *C. pusilla*.

Campanula rotundifolia. Beware the double.

Colchicum speciosum album.

Cotoneaster horizontalis. One of the very few shrubs I unblushingly recommend for the outcrop rock garden.

Cyclamen neapolitanum.

Daphne Cneorum. Another shrub.

Dianthus alpinus. Forms carpets.

Dianthus neglectus.

Epilobium glabellum.

Escalonia rubra pygmaea.

Eyonymus radicans.

Frankenia laevis. A British plant.

Gentiana verna. The glory of the Alps.

Helianthemum vulgare. Choose one of the single-flowered prostrate varieties.

Helichrysum bellidioides. One of the 'everlastings', and one of the best.

Hypericum reptans. Spreads a cloth of gold over the rocks.

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<i>Iris histrioides</i> <i>Iris reticulata</i> <i>Iris unguicularis</i> <i>Iris verna.</i>	}	The dwarf irises are invaluable in early spring, like flickering blue and violet flames amongst the rocks.
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Leontopodium alpinum. Edelweiss — grows anywhere.

Linaria alpina. A dainty lavender flowered mouth with orange tongue.

Lithospermum diffusum. Variety called Heavenly Blue has long been a best seller. Nursery catalogues still call the plant *Lithospermum prostratum*.

Lychnis alpina.

Mazus reptans. Excellent for the paved garden.

Myosotis alpestris. No English garden whether paved, rock, or otherwise would be complete without at least one species of forget-me-not. I am offering two.

Myosotis rupicola.

Oxalis lobata. A Chilian species with golden yellow flowers.

Parochetus communis. Alleged to be tender, but I grew it successfully in Middlesex, which is not one of the mildest counties.

Phlox diffusa. All the phloxes are North American. Many of them are quite hardy.

Phlox divaricata.

Phlox subulata var. G. F. Wilson. A delicious, cool, blue flowered dwarf.

Potentilla nevadensis.

Primula denticulata. An English rock garden without primulas is as unthinkable as oil without vinegar. *P. denticulata* in one form or another (often with a different name) occurs from Kashmir to China, along the length of the Himalayas. You can't kill it.

Primula marginata var. Linda Pope.

Saxifraga Burseriana.

Saxifraga × *Elizabethae.*

Saxifraga × *Faldonside.*

Saxifraga sancta.

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Sedum acre.

Sedum Canticolum.

Sedum Sieboldii.

Sedum spathulifolium purpureum.

Thymus Serpyllum. There are several improved varieties.

Veronica filiformis.

One plant of each of the above bought from a nurseryman might cost as much as £5 to-day; not more.

When choosing plants never forget that your object is to kindle a flame such that neither the heat of summer nor the cold blast of winter can put it out. It will flare up in response to the warm summer days, burn low when the sun travels far to the south, leaving the earth cold and the sky cheerless in winter; but it will never be put out. Though it may not, like the Greek vestal fire, burn for a thousand years, yet it will give you a peculiar joy all your life.

ALPINE AND ROCK PLANTS

BEFORE you finally decide what you intend to plant on your rock garden, bear in mind that you have a choice of plants belonging to three different categories, namely:

- (i) alpiners;
- (ii) rock plants;
- (iii) others.

Note that all alpiners are not rock plants, all rock plants are not alpiners, and many plants suitable for the rock garden are neither rock plants nor alpiners. The only criterion for 'others' is suitability. But indeed that applies to all rock garden plants. You sometimes see plants growing in the rock garden which are quite unsuited, and if they are unsuited it is of no consequence whether they are alpiners, rock plants or 'others'. Not all alpiners, and certainly not all rock plants, are suitable; whether or not they are suitable depends partly on the garden, but mainly on the plants themselves. Some plants suitable for a large rock garden are too tall for a small one, throwing everything out of scale. Proportion is of more importance in the rock garden than elsewhere. But some plants, quite often grown, are unsuitable for *any* rock garden large or small. The mere fact of a plant growing in the alpine region is not in itself a passport to the rock garden. On the other hand, it is generally a good recommendation.

If we study a mature rock garden we can easily convince ourselves that not all the plants growing on it are alpiners, and that some are not even rock plants; *Parochetus communis*, for example, which looks quite at home on a small rock garden and is in fact an excellent choice. The same is true of many veronicas, wild thyme, several dwarf iris, anemone, and a host of other plants. England has many delightful wild flowers which add charm to the rock garden, but

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which cannot by any stretch of imagination be called alpine in either a geographical or in a physiological sense, though they might claim to be alpine in a morphological sense. That is to say, though they don't come from the hills, certainly not from above the tree line (many of them grow, like primroses, *under* trees) and though they are not in the least adapted to the rigours of an alpine climate, yet in shape or *habit*, they resemble many alpine. The plain truth is that no special alpine form is stamped on the vegetation until extreme conditions are attained, in other words, until alpine desert is reached and the vegetation becomes scanty. The ordinary alpine flora is, in habit, not very different from the cool temperate herbaceous flora. The majority of alpine plants, outside the tropics, are herbaceous perennials of average size and normal appearance — normal, that is, to the English countryman who goes for walks and uses his eyes. Only a few adopt a more specialized habit. Shrubs replace trees, some being prostrate, others bushy. Many of these may be admitted to the rock garden by right of worth, but of course they must be selected with a jealous eye to suitability, or there will be misfits. It is no use planting a small rock garden with big shrubs, however alpine; the last thing we want to do is to dwarf the scenery with the vegetation. In nature it is always the vegetation which is dwarfed by the scenery; and though we are not trying to imitate nature, we can take hints from her. Shrubs, particularly dwarf shrubs — the 'dwarf' here implying that there are other closely related species not so dwarf — are invaluable in the rock garden for winter colour, for sheltering other plants, and for covering flat rocks and bare patches with outspread mat-like branches. But only the large rock garden can accommodate shrubs.

Not only must the plants bear some intelligible relation to the size of the rocks, but the rocks themselves must bear a sensible relation to the size of the whole rock garden. In alpine valleys one sometimes finds huge boulders — erratics

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or perched blocks, stranded by glaciers — thatched with a variety of plants, making an aerial garden. Such a one-piece rock garden, comparable in size with your house, would be out of proportion in your garden, even though you might grow a century of plants on it. Besides you would need a ladder to reach the top.

I have said, and I repeat, that plants suitable for a large rock garden may be unsuitable for a small one, and no better example could be found than *Meconopsis betonicifolia*, or the Tibetan blue poppy. Generally speaking, the only reason for excluding a first class plant is that it is too tall for a garden which is not itself life-size. Now *M. betonicifolia* in north Burma (var. *pratensis*), though an alpine, actually grows in meadows, and these meadows are tilted at a steep angle, being in fact the bases of alluvial fans. Though it grows three feet high, it was, in the Seinghku Valley where I first came across it, completely dwarfed by its surroundings. There would perhaps be a clump growing at the foot of a little cliff a hundred feet high, or nestling under the shadow of a large boulder ten or fifteen feet high, and as much through. Close beside it, a dwarf rhododendron, taking advantage of a fold in the ground, formed a compact tuft three feet high, and twice as much across. Right overhead, the flanks of the glen down which foamed the snow-fed Seinghku river rose for 3000 feet to bare crags and fretted towers along the angry skyline. Against a dynamic background the poppies, like sky-blue soap bubbles bouncing on the green surf of meadow herbs, looked magical. Even in that terrific landscape they caught the eye and held it. I stood spellbound for a space beside the Burmese blue poppy.

Torn from its alpine meadow, to exchange the scowling cliffs and naked scree for a politely miniature rock garden, it is not surprising it can't take it.

There are species of *Meconopsis* — *M. bella* is one of them — which are not only alpinists, but rock plants also. *M. bella* is

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the perfect alpine rock plant, and in bloom is bewitching. But in Bhutan, where I have seen it happy, it grows at over 15,000 feet in crevices of the bare cliffs, much higher than most alpiners. In Britain it only survives in a few localities, and then never achieves the dimensions and flower pressure that the wild plant does.

It would be easy to name others, but enough has been said to make the point clear.

Size is an important criterion of suitability in the rock garden, not only because the rock garden is model size whereas the plants are life-size, but also because alpine plants are on the whole small. Most rock plants, too, whether alpine or not, are stunted, although a few in warm regions at any rate are considerably larger than anything we can accommodate in our rock gardens. If any further argument is required why we ought to keep our rock garden plants small, there is the obvious question of space.

Trees, of course, are entirely out of place in the rock garden. So also are obvious xerophytes from arid or semi-desert regions, cactus and cactus-like plants, aloes, and all the tribe of bizarre succulents which maintain an armed neutrality. Climbing plants are equally unsuitable (since there is nothing for them to climb up); unless they can be persuaded to creep and crawl — not intrude into the fold, but carpet the rocks gracefully. Creeping plants, or carpeting plants, are very useful in the rock garden, but not climbers — which people often call creepers, I don't know why. Creepers are *not* climbers, though some climbers will behave as creepers, particularly amongst the bumps and hollows of the rock garden, if they can find no other support. They would rather climb; but it is not so vital to them that they would prefer death to a dishonourable truce with earth. For instance, on a large rock garden even some species of Clematis, a climbing family *par excellence*, do well and look well trailing over the rocks. On the other hand, several excellent gaultherias, *Rhododendron repens*, *R. radicans*, *Para-*

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chetus communis, *Euonymus radicans* and many other plants are true creepers, not climbers. On a small rock garden room should be found for two or three of the less aggressive type of creeping plant, the slower growing — within reason — the better. The above-mentioned *Rhododendron repens*, though a magnificent rock creeper, is a bit *too* slow growing for most people. Specimens I have met with in Tibet pouring over the rocks like a stream of molten lava, must have been a century old. It grows less than an inch a year under natural conditions.

Cliffs are not confined to the alpine region, as all who know the white cliffs of England can testify; and it is a reasonable inference that where there are cliffs and rocks, there also will rock plants grow.

In the foothills of the great mountain ranges, rock exposures occur at all altitudes, and are nowhere better displayed than in the ever-rain forest regions of north Burma and Assam. One has only to find a rocky ridge or an escarpment at an altitude of 6000 or 7000 feet in north Burma to be certain of finding vegetation very different from that of the climax forest, including rock plants in some variety. I first noticed the bushy little box-like *Rhododendron vaccinioides* growing on an exposed rock ridge at 6000 feet in north Burma. Species of begonia, several Gesneraceae, *Iris Wattii*, primulas, e.g. *P. Normaniana*, and other rock plants grow beneath the trees or in shady nooks in such places. These are rock plants, but they are not alpinists, any more than the English primrose — not a good rock garden plant, by the way — is an alpine. A few of these rock plants, for example *Rhododendron vaccinioides*, are not confined to rocks; they grow equally well on trees, as epiphytes. It would make the position clearer perhaps if we said that many epiphytes grow equally happily on rocks in the open.

No reasonable person would dispute that the key to knowledge of how alien plants should be grown in the rock garden is best sought in the knowledge of how they grow in the

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wild. That implies some acquaintance with the kind of place in which they grow, the nature and composition of the soil, climate, especially humidity, and conditions generally in their homeland.

Britain may be a rich country, but it has a very poor climate; or so we are told by our friends overseas. We cannot offer our mountain guests all those little refinements to which their higher civilization has accustomed them in their own land — air conditioning at all seasons, water laid on, cold storage, and the rest. Some item vital to a plant's well-being may be lacking; some item it cannot endure may be its daily lot. In either event, the plant will not be long for this world. But that many aliens from far hills have in fact settled down in British gardens is a practical tribute both to our climate and to our horticultural skill. The cynic may scoff that the pretensions of many alpine plants to be tough guys from the back of beyond is really bogus, since they also grow quite happily in far less Spartan surroundings; or conversely that alpine pastures are not really at all Spartan. Nevertheless, the adaptability of these plants is remarkable.

However that may be, it would seem only wisdom to study all the conditions under which plants thrive in natural surroundings, and learn as much about them as we can. Thus it is an advantage to see them actually growing in the mountains. Nor is it necessary to visit Tibet or the Andes of Peru to do this. Alpine plants the world over grow under much the same conditions, and a visit to the Alps will teach us a lot.

One of the first things that will strike the observer — if he is observant — is the surprisingly poor soil in which many alpine rock plants grow. Some of them appear to be growing in no soil at all, for example, plants growing out of joints and cracks in granite cliffs. Many plants growing on scree (especially at high altitudes), although certainly connected with deep-lying soil, appear to be growing in bare shingle. On the other hand, plants perched on the flat tops of great

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boulders whose sides are just bare crystalline rock are usually found to be growing in several inches of rich humus or peaty soil, which has slowly accumulated in the hollows of the summit.

With regard to those other plants which grow in cracks of the cliff, one may say first that the location is not quite so soilless as it looks from the outside; secondly, that the soil is not usually so poor as it looks.

Plants do not grow the hard way from choice — if they could find a better 'ole they would occupy it. They would prefer easier living conditions, just as a man prefers comfort to discomfort; but many will put up with what they can get. If we examine any herbaceous perennial alpine rock plant wedged into the crevice of a bare cliff, all we can see is a short rootstock or rhizome clothed with a continuous armour of dead leaf bases, firm as the scales of a fish at the growing end, but becoming more and more spongy towards the root end, just a brown soggy mass of withered leaves, each tuft of which represents a year's growth — you can count ten, twenty or more tufts in the space of about a foot, which gives an idea of the venerable age these rock crevice plants attain, and their slow rate of growth.

Try to prise one out of its niche. You cannot. Leaves and flowers spring directly from the apex of the rhizome which quickly passes below into an immensely long woody tap root, with doubtless many ramifications. If you pull at the annual shoots you merely tear off separate leaves and flowers; the rhizome does not budge. It would need a charge of gun-cotton to open out the crack and expose the ultimate rootlets which probe several, perhaps many, feet down inside the living rock.

At the end of the year, leaves and flowers die down, the rhizome has grown a fraction of an inch, and new flower and leaf buds are formed ready for next year. The crack may be covered over with snow. Anyhow, each year's leaf and flower contributes something to the stock pot which

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accumulates within the crack, partly washed in by water, partly blown in by wind, but mainly derived from the plant itself.

Such cliff plants — for example, *Paraquilegia grandiflora*, *Potentilla peduncularis* and *Primula pulvinata* — seem to be forever out of reach of our rock gardens, at least in the lavish luxuriance of thirty and forty years' growth which they display in China. If we induce a single flower to open, one year, we feel we have achieved something. And indeed we have. But this is not comparable with the real thing. A tuft of *Paraquilegia grandiflora*, or of *Meconopsis bella*, a quarter-century old, fluttering from a cliff in full bloom is a sight to take one's breath away.

If now we turn to alpine scree plants, growing by themselves on an apparently bare stony slope, we find a very similar state of affairs, except that here (with patience) we can trace the roots to their ultimate tips. For we can dig out or scrape away bit by bit the loose material of the scree and so expose the entire root system. What we shall probably find is first a stout tap root which at a depth of a few inches will fork so as to form an inverted λ , each branch of which soon begins to break up into a mass of fibrous roots spreading in all directions and penetrating to a depth of several feet. As we dig down, we notice that the material of the scree grows finer and finer, until at last it is no coarser than ordinary sand; and that it quickly becomes moist. At this depth there is a certain amount of humus, scattered throughout, derived from plants which have lived and died on the scree; and sharp as the drainage is — for the scree slopes at an angle of about 50° — it is clear that below the surface, where at high altitudes evaporation is intense, a good deal of water is firmly held by surface tension.

Of course these are rather extreme examples; they refer to near-desert conditions. Happily not all places in the alpine zone are so pauperized as cracks in the cliff and high screes. On the contrary, most parts of the alpine zone near the tree

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line, such as meadows, turf slopes, gullies in which the snow lingers late, and so on, boast good fat soil such as hungry plants love. Where tangles of rhododendron grow, a foot-deep humus rapidly accumulates, forming a dark mushy soil. In alpine meadow the plants grow two or three feet high every summer, to be pressed flat in winter by the weight of snow; and here also the matted vegetation is slowly converted into a sort of peat, or something like it.

These then are the plants and the surroundings with which the rock gardener deals. Each plant must be treated on its merits and eccentricities; there is no common denominator. Many of them can only be successfully grown under glass in the alpine house, where temperature, drainage, and above all humidity, can be to a limited extent controlled. With these we are not concerned.

It is evident, then, that although alpine plants by no means monopolize the rock garden, yet rock plants are more exclusive to the alpine region than to anywhere else. And the reason is clear; nine-tenths of the alpine region is rock; anything which is not rock is of secondary importance.

Thus it is highly probable that the majority of our rock plants will be contributed by the alpine region, which includes the tops of our Welsh and Scottish hills, above the tree line.

The change which a high alpine transferred from China to Chelsea undergoes is far-reaching. The really surprising thing is not that some Asiatic alpiners fail to live in Britain, but that any survive. That plants from Japan, and even from New Zealand — 'even' because of their long isolation in the southern hemisphere — should flourish under the not too dissimilar conditions found in some parts of Britain is no particular cause for wonder; but that plants from 12,000 feet and from one end of the Himalayas to the other, or from the alps of south-west China, should do so, is remarkable.

CHAPTER VI

SHADY WORK

THAT some plants need more shade than others is a matter of common knowledge. No green plant will grow or live in utter and everlasting darkness; in other words *some* daylight is essential to the life of a green plant. But how much? Arctic plants live in full daylight round the clock for six months on end, followed by six months in near-total black-out. In the tropical rain forest many plants live and thrive in everlasting twilight, which certainly would not suit those living on the tops of high mountains; in alpine regions plants live in an almost continuous blaze of light brighter than Arctic sunshine in summer, even when the sun does not shine, while in winter they are often covered by snow, or they die down to the ground. Many desert plants have a permanent place in the sun so long as any part of them is above ground; shade by day is unheard of, though the sun sets at nightfall. It must be remembered however that most alpine, Arctic, and desert plants show their faces above ground for only a few months in the year. Their roots are in darkness, anyway.

What bearing has all this on our rock garden?

Just this. Since there are no trees and, in the small rock garden described here, not even shrubs except prostrate and creeping shrubs (and nothing can grow under *them*), shade, if provided at all must be provided by other means as required. It is in fact provided by aspect.

Let us briefly consider this matter of shade; briefly because shade in the rock garden has low priority. Rock gardens are built in the open air beneath the blue sky by day and the stars by night. They need all the sunshine there is. *Some* shade you can have, but not much; it is of quite secondary importance. Shade is not the same thing as shelter, certainly

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not in the alps. 'Shade' means only protection from light and heat — that is, from the direct rays of the sun; whereas 'shelter' means shelter from the stormy blast — in England particularly from an east or north-east wind. Our rock garden may need that too; and if so it is best provided by a hedge, wall, shelter belt of trees, or even by the house itself. These must not crowd too closely on the rock garden, however, especially trees, which would cast heavy shade in fair weather and drip in foul weather. Those English gardeners who suffer from the distressing effects of sou'-westerly gales may jib at the suggestion that only east winds are to be feared and that nothing else matters. But there is all the difference in the world between a nor'-easter which blows from the continent of Europe and may have originated in Asia, and a sou'-wester which blows out of the Atlantic. A nor'-easter is generally cold or very cold, but whether cold or hot it is always dry. It has a desiccating effect on the vegetation and is in fact a killer. But an ocean wind is comparatively mild even in winter, and *always* moist. It does not freeze plants and what is far more important, does not dry them up. It buffets them; but it is definitely not a killer. That is why the rock garden, at least in the colder parts of the British Isles, only needs protection from an east or north-east wind.

On the other hand a sheltered slope in the Burmese alps would be a north slope, protected from the fierce though brief heat of the sun and from warm air rising off the plains in spring.

Since neither trees nor shrubs capable of casting a shadow are permissible on our rock garden, shade from the direct rays of the sun must be sought under rocks and other surface features. Hills and rocks cast shadows just as trees and buildings do; and in broken country there are plenty of shady spots, facing north or east, as anyone may observe for himself. It is of course in shady hollows facing north that snow lingers late, in the Grampians no less than in the

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Himalayas. In New Zealand and in South Africa, on the other hand, the *southern* slope is the sheltered slope. In other words the rock gardener must trust to aspect for shady nooks where he can grow those plants which will thrive only in shade — the truly sun-shy plants.

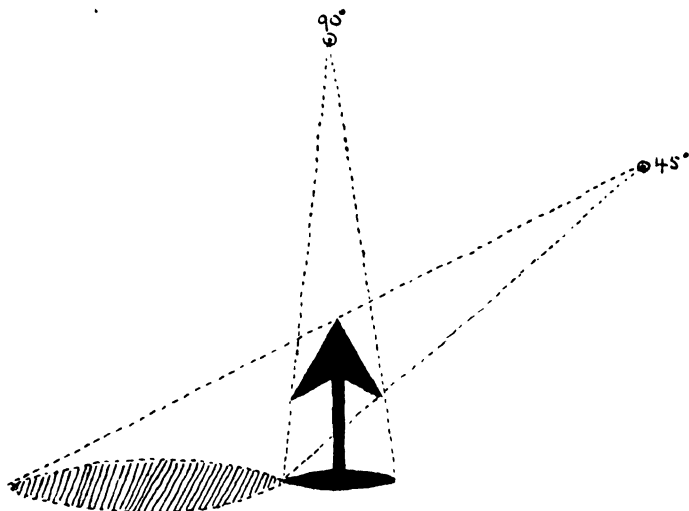


Fig. 5

When the sun is vertically overhead as at noon on the equator at the equinox, a tree or a rock stands on its own shadow. When the midday sun is only 45° above the horizon the shadow is much longer. In any latitude shadows shorten as the sun climbs the sky between sunrise and noon, lengthen as it sinks between noon and sunset.

If he constructs his outcrop with a gentle slope to the south or south-west and an escarpment, a regular cliff, some three feet high facing north, he will find all the shade he needs. Even in England when the noon sun at midsummer in London is 75° above the horizon, a vertical north-facing cliff only two feet high will get no sun all day. On broken ground with bold upstanding rocks and deep hollows, there is ample shadow. If more is wanted, it is easy with a few extra rocks to construct those hermit-like cells in which some rock gardeners delight to bury their shiest treasures.

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A tall tree or a high cliff casts a longer shadow than a short one, so it is obvious that by making the north face higher the area more or less permanently in shadow can be increased. (Fig. 6).

It is also obvious that if your garden is further south — say on the shores of the Mediterranean — it is less easy to provide

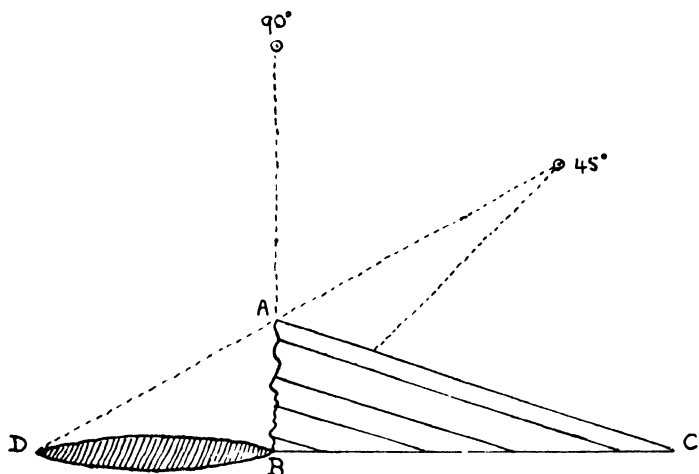


Fig. 6

With the sun vertically overhead, the outcrop rock garden gets no shade. If the altitude of the sun is less than 90° the cliff AB is in shade, the slope AC facing due south in full sun all day. The length of the shadow BD depends on the height of the cliff AB and altitude of the sun, which in turn depends on the latitude and time of day and season.

shade at midsummer because the sun is higher in the heavens. In winter of course it is not difficult; even in Cairo the noon sun at Christmas is less than 60° above the horizon; that is to say considerably lower than it is in London six months later. The great difference is that in Cairo, the sun shines and in London it does not. When the sun is vertically overhead, as in the tropics at midsummer, aspect means nothing. There is no shade.

One of the first things the traveller to Singapore, Colombo, Rio, or Mombasa notices is the utter lack of shadow at

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midday, and the resulting glare. A man or a building or a tree stands on its own shadow. Everything is bathed in an overwhelming flood of hot sunshine from which there seems to be no escape. If it were not for the heat, alpine gardening on the equator would be a great success; for alpine plants enjoy sunshine and cannot have too much of it. As it is, only succulents and leathery xerophytes grow on rocks in Singapore — a strange paradox for so humid a climate.

On the edge of the tropics, however — in Mandalay, for example — though the sun is directly overhead at midsummer it is only half way up the sky at Christmas — when incidentally it is much more likely to be shining! Hence though June days are shadowless, December afternoon's shadows stripe the country like a venetian blind.

Though we are not gardening in Mandalay, it is an advantage to understand this business of shadow in the rock garden. There is nothing like learning from nature such lessons as she can teach us by our own observation; and a scramble amongst the hills will give us an unforgettable picture of sunlight and shadow. A north cliff need never get any sunshine at all; even at midsummer in our latitude it may be in shadow. But a south cliff may be bathed in sunshine from dawn to dusk in summer and for several hours a day in winter — so long as the sun is shining.

You might infer something of the sort by noticing that not only are many of the plants growing on the two faces of a mountain different, but the type of vegetation may be different, as for example crisp turf on the south slope, woods on the north. In the alpine region these alternes (as they are called) are very conspicuous, a series of parallel mountain ridges presenting quite a different appearance when viewed from the north and from the south. In north Burma and many other mountain regions, man emphasizes this by cultivating only those slopes which are easily cleared of their wild vegetation. He does not cultivate north slopes covered with evergreen forest.

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Above 12,000 feet in north Burma north and south slopes are different worlds.

Here another factor enters into the problem — snow; the snow itself however is largely due to aspect. On south slopes exposed to sun and to warm air rising from the plains, most of the snow melts before June; or it avalanches down the steep gullies whose flanks are flayed bare by its passage. Nothing grows in these mountain scuppers in the track of the snow. But south-facing screes are dappled blue in autumn with *Cyananthus* and gentian or sprinkled with the myriad glistening hailstone berries of dwarf *Gaultheria* and pygmy *Sorbus*. Apart from its important role of keeping the plants snugly tucked up like Eskimos in winter, the effect of snow in the Burmese alps is to provide a steady supply of water in spring and early summer, whereas on south slopes the snow has all disappeared before air and soil have had time to warm up. In winter it is the north slopes which are warm, thanks to the snow blanket. Plants growing on south slopes have no protection from the icy winds of early winter. As a result it is not till high summer when the screes are watered by rain that the vegetation shows any sign of life. Most of these scree plants are autumn flowering species.

On north slopes the gradually melting snow provides an unfailing supply of water at a season when there is enough warm air floating up from the deep valleys to awaken the vegetation from its winter sleep, but an uncertain rainfall. Mainly as a result of this conservation of water, and to protection from wind, north and east slopes in the Burmese alps support — not indeed forest (if they did they would not be alpine!) but the next best thing, namely scrub. This comprises a dense impenetrable growth of shrubs with gnarled interlacing stems two or three feet high spreading out sideways and more or less flat-topped like tea bushes in Assam, and kept pruned by the wind. Three-quarters of them are species of *rhododendron* which in June give rise

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to a furious, many-coloured blaze daubing the mountain-side with blood red, pink, purple, carmine, ivory, sulphur, and crimson in enormous blotches. Nevertheless, the small outcrop rock garden is not for these, but first and last a place for sun-worshippers. Yet there is no difficulty about growing these shy alpine rhododendrons from Burma, if you want to, on your sunniest slope; always provided the soil contains no lime. Northernmost Burma is only 22° south of London. But you must not be surprised if what stops short at two feet in Burma attains five feet on your rock garden: you lack nature's windy shears!

However we are dealing with the small outcrop rock garden, where there is hardly room for the tiniest rhododendron but only for the bold brave vivid alpine, flaunting its colours recklessly to the sun; and the beginner is advised to build it so that the maximum area gets full and continuous sunshine; a few shade plants can be grown on the north slope, if there is one.

Of course it is easy to make the north slope a gentle incline also. If that is done there will be *no* shade in your rock garden. That will mean a slightly more restricted choice of plants, but concentration on sun-worshippers will at least ensure a brilliant display of bloom throughout the summer. The ideal is to have some colour in the rock garden all the year round. Who does not thrill with exultation at the sight of snowdrops and crocuses breaking through the cold bare earth and braving the February winds? What bright splashes of colour they make in an otherwise drab expanse; heralds of the new order as it were. And who does not heave a sigh of regret, not unmingled with hope, for the fading brilliance of summer as it gradually makes way for the first warm glow of autumn colour?

However, many devout gardeners will be well content if the rock garden, to begin with, can be made to break out in rich colours during the summer when gardening is a pleasant pastime. This should be the beginner's target, six or eight

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months of glorious life and colour; from that he can gradually build up to colour all the year round.

Another characteristic of alpine plants is their lack of stature. The flowers may be very large, like the relatively enormous trumpets of *Incarvillea Delavayi*, yet borne on pygmy stems. In many plants they hug the ground or nestle cosily between rocks or peer coyly from cracks as though looking carefully round to make sure that no danger threatens, ready to withdraw swiftly at the first sign of movement. Shrubs lie prone, never lifting their heads high. *Cotoneaster horizontalis* looks like green coral — a fan coral studded with blood-red beads when in fruit. The high alpine gaultherias creep and crawl and so also does *Euonymus radicans*. Even the dwarf alpine rhododendrons are as flat as pancakes — notably *R. radicans*. Some of the alpine berberis which form lusty bushes when grown in England keep their heads down to avoid the wind in Tibet. *B. chrysosphaera*, for example, crouches against the rock in its native land; in England it looks like making a tidy hedge. And all these prostrate plants are in varying degrees contemptuous of shade.

The point is that the majority of alpine plants, even those which refuse to conform to the regulation alpine habit, whether rosette, mat, cushion, and so forth, are of lowly stature. Some do grow erect in the orthodox manner, but most of these at least form clumps like the saxifrages. Also they are generally dwarf.

There are several reasons for this dwarfness. One reason is the intensity of the light in the alpine region and its persistence all day throughout the summer; that is to say, the complete absence of shade other than the shadow cast by a northern aspect. That 'light retards growth' is one of the hardest-worked clichés of botanical science. It is well illustrated both in the dwarf stature of alpine plants (although as I have just stated light is not the sole cause of this) and in the frequently large size of leaves amongst the undergrowth of the tropical jungle.

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While every point on the earth's surface receives the same amount of light (*amount* measured in hours; not intensity) in a year, its distribution throughout the year is obviously very different. Everywhere it is intermittent; light and darkness, or day and night, succeed one another. But whereas at the poles night succeeds day at intervals of six months on the equator night succeeds day every twelve hours. There are long daylight plants and short daylight plants.

Within the limits of the temperate belt there are considerable differences not only of temperature, but also of light. For example, in London, the noon sun at Christmas is only 16° above the horizon or 74° away from the zenith. In Edinburgh it is only 11° above the horizon and daylight lasts barely 9 hours, as against 19 hours in mid-June. We know that some plants will grow only in deep shade, others only in full sunlight. But the *length* of the day too may be an important factor. Plants from the Eastern Himalayas, growing normally in latitude $25\text{--}30^{\circ}$ removed to a region 25° further north face a very different light ration. Equal latitude is for some plants probably — and not alpine only — a necessity for their survival; but where a higher latitude is used as a substitute for higher altitude, this is impossible to achieve. Happily a great many plants are tolerant towards the light ration and adapt themselves. Look for example at *Primula Florindae*. This plant is a native of south-central Tibet growing in the Tsangpo Valley, some 200 miles east of Lhasa, in latitude 30° , at an altitude of 11,000 feet. It grows almost equally well on the west coast of Scotland, less than 1000 feet above sea level. Here the difference of 10,000 feet altitude has been compensated for by a difference of 25° of latitude. But no correction has been made for the very different illumination it receives in the north; $3\frac{1}{2}$ hours *more* daylight at midsummer, which is of course the growing season; 3 hours *less* daylight at midwinter — though the high altitude plant, being

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under snow, may in fact be in almost total darkness for some months.

Another reason is the desire to escape exposure to the wind which at altitudes of over 12,000 feet is cold and violent.

But probably the most effective cause of the dwarf habit is just plain starvation.

Alpine shrubs when brought down to the plains not infrequently confound their discoverers by growing and growing until they form large unrecognizable bushes, as though some restraint had been removed, and they could for once be their real selves. This in turn suggests that more and better food has caused them to grow. But amongst herbaceous plants, dwarfness is less volatile, and the change of altitude, great though it is, scarcely affects them in any way. A few alpine mock our theories by attaining a huge size in the alps while their relatives on the plains are quite small. Who would expect to find giant sorrels like *Rheum nobile* on the barren, wind-swept boulder slopes of alpine Tibet!

Another effect of light is to encourage the production of flowers. In the alps of Chinese Tibet are found certain long-lived primulas, usually growing on exposed cliffs and producing at the ends of their woody stems a tuft of shrunken leaves from the centre of which springs a compact rosette of flowers. Occasionally I have come across huge pouff-like specimens of *Primula Dubernardiana* growing in damp shady nooks on wooded cliffs right out of their proper element. They were lush plants with masses of large sappy green leaves but never a flower to brighten the sage green. High living had been their ruin.

Dwarfness is a characteristic of alpine — not of rock plants in general unless they are alpine first and rock plants afterwards. Half the charm of rock gardening consists in so rationing these miniatures that they retain their true alpine form as they encrust the rocks like icing on a bridal cake, then break out in a fairyland of starry flowers.

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It is to encourage these small sun-bathers that I advocate a general slope of the outcrop rock garden to the south and west; under these conditions the majority of plants must have a place in the sun. The more sunshine and the less food (within reason) your plants get, the better will they respond.

Of course, a cliff facing south, or a series of abrupt steps alternating narrow and wide, as opposed to a gentle talus slope, may also be made to look charming; cliffs do not necessarily have to face north. Nor need there be any cliff. The keen gardener will not fail to explore all the possibilities — there is no virtue in sticking rigidly to a formula.

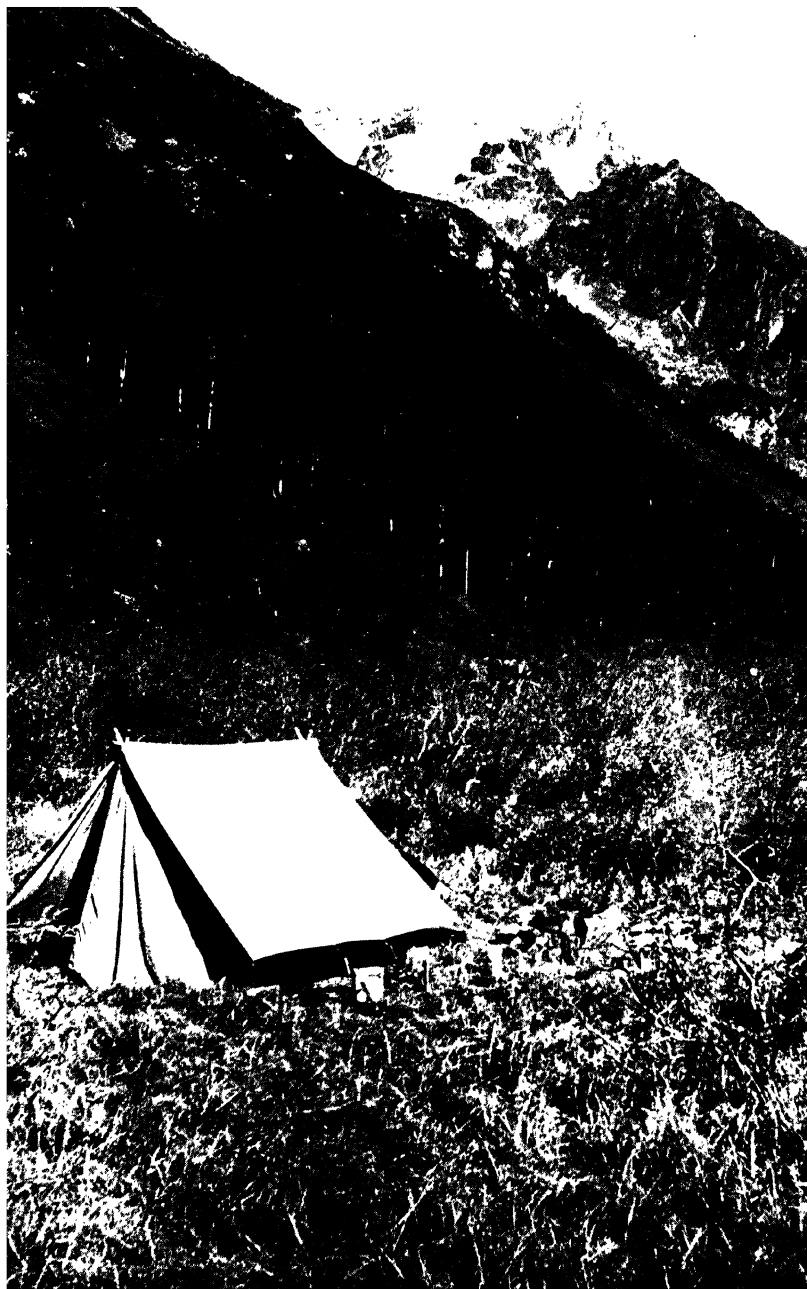
A southern escarpment is easily constructed; and though it restricts the choice of plants it is perhaps better if the entire outcrop rock garden is sunbound and shadowless.

Shelter is another matter. In many parts of England some kind of shelter is necessary; but it is the rock garden as a whole rather than individual plants which requires it. To the beginner I would repeat — don't worry about shade: rock gardens were invented to encourage sun-bathers, not cave-dwellers.

But if aspect in the alpine region is important, not less so is the quality of the light; the total absence of overhead shade in the Burmese alps and other mountain regions may well have a certain significance. The brilliant colours of alpine and of North Temperate flowers generally has often been remarked. Seeing them for the first time, we speak with bated breath of the gentians in the Swiss alps, those incomparable blues *Gentiana verna* and *G. acaulis*, not to mention the equally gorgeous *G. sino-ornata* from the Chinese alps. But are these colours really more brilliant than our own gorse and heather? I doubt it. Blue hits you smack in the eye in bright sunshine, though it is the first colour to go out in the twilight.

Another factor is concentration. Yet how well I remember seeing blue poppies for the first time! Nothing concentrated about them! — they grew completely isolated on the barren





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boulder screes at 16,000 feet. You could pick them out 100 yards away, one here, one over there, brilliant against the grey stones as Bengal lights.

I suspect it is because gorse and heather are familiar things, much more familiar than blue gentians at any rate, that we do not wax lyrical about their colour.

Still the light undoubtedly has a quality at 10,000 feet which it lacks at plains level. The air is not only thinner in the alpine region, it is cleaner and hence clearer. It is certainly freer from dust. Hence there is less diffusion or scattering of light, which is therefore more concentrated. That is one reason why the colours of alpine flowers seem so bright.

CHAPTER VII

WHAT'S IN A NAME?

THE true rock gardener will not only build his rock garden with his own hands, he will also maintain it. This implies real hard, sometimes back-aching work; but it is worth it.

A garden, and particularly a rock garden, is never completely created but always in process of being created. When we view it as a finished work of art, time is standing still for the moment. It was not the same yesterday, nor will it be the same to-morrow, for our rock garden is in process of evolution — largely man-directed evolution as we add new plants, or remove old ones. There is also, of course, a natural evolution of the whole, as the seasons wax and wane, plants grow and die, seeds germinate. In other words the rock garden is undergoing constant change: it is like the slow passage of a cinematograph film. The framework — that is the rocks and the soil — may remain more or less static, though even this will be subject to a small amount of settling down and to minor adjustments due to weathering of rock, growth of vegetation and action of animal life underground. In the mountains of Asia, the alpine regions are dynamic; yet compared with the vast panorama the movement is negligible.

The rock gardener then must be prepared to sally forth trowel in hand every evening, for eight or nine months in the year. He could find few pleasanter or healthier pastimes. Each of his plants, whether 50 or 500 in number, demands individual attention; but of necessity there is a limit to the number of plants one man can care for. He must plant his specimens with his own hands, ramming the roots firmly in, and pressing down the soil all round. He must go over the ground between with a fork, removing the weeds. He must make war on slugs and snails, beetles, caterpillars, and other

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pests: but earthworms he must respect. The rock garden is apt to become a haven of refuge for assorted zoological specimens not commonly found in other parts of the garden.

He should keep a record of the plants he cultivates — a sort of Pepys Diary of the Garden — noting how each specimen came into his possession ('received 3 monstrous fine hollyhocks from my neighbour Mumble') and anything peculiar in its behaviour or treatment and its ultimate fate ('killed in the great frost, January 1940', 'died in the April drought of 1945'). Such a record is not only of personal interest, it may contain observations of lasting value. In this connection, labelling of plants with their correct name is important. Good labels are expensive; wooden labels with the name legibly written, though short-lived, will do: but nothing less permanent. They must be firmly thrust into the soil close to the right specimen. One reason why labels are essential, even if they make the rock garden look like a graveyard, is because many rock plants disappear underground in winter, and would be in danger of a fatal exhumation did not a label warn us there was buried treasure there. When forking over the bare earth, labels warn us that this is holy ground and we must fork with care.

This brings us to the vexed question of names. Many people are discouraged by the 'unpronounceable' names they read in catalogues. They want to know what is the 'common name' of a plant, and why they can't all be known by their common names. Such questions are easy to answer and should never have been asked. How can a plant which came originally from the Chilian Andes say, now growing in your garden, have a 'common name', or at any rate an English common name? Or do you think that the English should have given it a 'common name' when it first came into cultivation?

Still, it has a name — a Latin one — and it is this apparently which arouses wrath and despondency.

The reason it has not a common English name is because

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it is not a common English plant. But if it *had* a common English name, it might equally well have half a dozen. Why should not several people bestow a 'common name' on it, and who is to decide which is the right one? As soon as the same plant has acquired several names, each recognized by a certain number of people and none recognized by all, or as soon as the same name is applied to several different plants, confusion results. In discussing a plant with your friend, it is impossible to be sure that both of you are referring to the same plant. Hence it is important that one name should refer to one species and to one species only, not only for scientific but for everyday purposes. It is equally essential that each species should have one name, and one only; though this blissful state is rarely achieved in practice.

Moreover, the first person to discover a plant is not necessarily an Englishman. He might be a Frenchman, or a German, or a Russian, and if so, he would be unlikely to bestow an English name on his plant; his 'common name' if he gave it one, would surely be French, or German, or Russian. So far as foreign plants are concerned, English has no priority.

The first necessity therefore seems to be to standardize the language in which the names of plants are recorded — and for this purpose Latin was chosen some centuries ago, when it was better known amongst educated men throughout Europe perhaps than it is to-day. It is true that many plant names are actually Greek (e.g. rhododendron); but even then they are often dressed up to look like Latin.

Latin or Greek may be unfamiliar, but it is not unpronounceable as is commonly supposed, so nobody need be frightened at it. The amateur gardener is not frightened at the sight of names like primula, iris, crocus, or even delphinium — all either Latin or Greek — because they are familiar to him; nor does he find them difficult to pronounce.

Whilst on the subject of plant names I note that it is the custom amongst writers of books on rock gardening to give

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an alphabetical list of plant names suitable for the rock garden modelled on Robinson's *English Flower Garden*. In fact the bulk of such books as Farrer's *English Rock Garden* consists of a plants *Who's Who*. I have not followed this convention because in the first place such lists already exist, complete and up to date, and in the second place I consider it unfair to burden any plant with yet another description of its appearance. So different does the same plant appear in the eyes and words of each writer that the bewildered reader may well wonder what it really does look like! The plain truth is that no two descriptions of a species as seen through unscientific eyes ever remotely resemble each other, or describe the species, because no description, unless written in previously defined terms, is ever objective. The descriptions themselves vary from the terse factual sales talk — height, colour, flowering season — of the nursery catalogue to the extravaganzas or faint damnations — according to whim, of Farrer and his disciples. All the same these descriptions, especially those of the voluble Farrer, who never uses one word where two will do, conjure up the image of a living breathing plant; which is more than can be claimed for any botanical description of a herbarium mummy.

Some modern writers who, lacking Farrer's scholarship, hardly seem to appreciate the difference between Latin and Greek, nevertheless insist on giving the derivations of the names of plants. This is padding. However if derivations are given they should at least be correct. Too often they are glaringly wrong. If rock gardeners really want to know why a particular plant is called *Dianthus neglectus*, or rather what those words mean — which I doubt — they would be well advised not to depend too altogether on horticultural works for their information. Nor are these same writers always correctly informed about the place of origin of the species they are describing. I read somewhere that it was more important to know the correct name of a plant than to know

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where it came from, a dictum with which I could not more heartily disagree. It is certainly important to know the correct names of your plants; it is even more important, and far more interesting, to know where they come from. The gardener will find it easier to cultivate a plant if he knows whence it was derived and something of the conditions under which it grows naturally, than if he knows no more than its correct name. People go potty over postage stamps, and the philatelist tells you complacently that he learns 'geography' as a result of collecting them. If dead postage stamps can teach one geography, how much better can living plants, which likewise come from all parts of the half civilized world.

On the other hand, much painstaking research has been done in tracing the correct botanical names of plants long known in the horticultural world under a wrong name.

What the amateur gardener often asks is — *who* names plants? Why, or how did a species acquire that particular name? He might be rather startled if one were to reply — 'Well, if *you* find a new plant, why not name it yourself, and incidentally thereby acquire immortality — botanical or horticultural immortality? No one will prosecute you for it. Only, before you embark on this course, make quite certain that your plant *is* new — that is to say, has not already been baptized. Otherwise you are adding to the confusion which is already bad enough.'

Now plants are no more born with names than are babies, nor does a name descend from high heaven to alight on some unsuspecting vegetable. In other words man gives a name to each plant. And if *you* find a new plant there is nothing on earth to prevent your giving it a name which henceforth will be recognized by all, including Science. Of course you wouldn't be so gauche as to name it after yourself — it isn't done. But you may name it after your best friend, wife, mother, sister, brother, or anybody or anything else. You can name it after last year's Derby winner if you like. In

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that case you ask, where does the immortality come in? It comes in as the authority for the name. Thus suppose your name is Peter Smith, and you discover a new species of iris, let us say. You name it for your best friend, George Raft; and it becomes, in its pseudo-Latinized form, *Iris Raftii*, P. Sm. Here P. Sm. — you — is the *authority* for the name, so that if somebody else, in later years, names *another* iris *I. Raftii*, it cannot be confused with *I. Raftii*, P. Sm. In fact, it cannot be accepted, in botanical circles, as there is already an *I. Raftii* — the name is occupied, as botanists say. Nor can *Iris Raftii*, P. Sm. ever be called by another name and get away with it; the alias will inevitably be unmasked sooner or later and identified with the original *I. Raftii*, P. Sm. But the passport to a valid name is a valid description of the species in botanical language.

You may wonder, of course, how you are to know whether your Iris is a new species or not. Well, that of course is another story; you can only know for certain if you are familiar with all the species of iris which have previously been described, or at any rate have read descriptions of them. That implies a little botanical knowledge, more difficult to acquire.

Every plant has at least *two* names, like *Primula vulgaris*, *Iris hystrioides*, and so on. Many have three, as *Silene acaulis alba*. The first is the generic name, the second the species, the third the variety.

In a perfect world all plants would have names, and no plant would have more than one name — one name consisting of two or three words, as above. Unfortunately a great many plants have more than one name, though it is exceptional for them to be known by more than one name at a time. More commonly the name has been changed, perhaps several times. This of course makes it more difficult. The name by which the plant is known to botanists at a given time is its 'real' name; all other names are synonyms, and are not used in the best botanical circles — which do not

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include horticultural catalogues. I do not propose to weary the reader with *how* plants acquire a string of names in spite of the efforts of earnest people to attach only one name to each species, and never to attach the same name to two different species. The best-laid plans go wrong. If the reader is interested in botany, particularly in that section of it which is concerned only with the identification and naming of species (called taxonomy), he will soon discover how a plant picks up names in the course of its chequered career, as a dog picks up burrs.

But the plea that a plant ought to be called by its 'common' name (always of course in English) really cannot stand. For, as I have pointed out already, a great many plants from the ends of the earth *have* no common name, certainly no English one.

It is true that some foreign plants widely grown in this country acquire a popular English name. The South African kniphofia, for example, used to be called 'red hot poker' in my youth — a good descriptive name. But I cannot vouch for its currency outside a limited circle. It may have other 'common' names elsewhere; and on the other hand the 'common' name of red hot poker may have been bestowed on other foreigners, less deserving; by other people.

When I found plants unknown to me in Tibet or Burma, but did not know whether they were new to science or not, I used to christen them with popular names which were more descriptive and easier to remember than field numbers. Thus I called the rhododendron now known to botanists as *R. patulum* 'rock rose'; *R. cerasinum* was 'coals-of-fire'; *R. imperator* 'purple emperor' (hence the Latin name of course); and *R. pumilum* 'pink baby'. Not inspired names perhaps, but easy to remember. There was good reason for giving these plants common names at the time I found them, because many of them had *no* names. They were or might be, new species, and had yet to be named by me or by some other botanist according to the usages of Western science, as

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R. imperator, *R. patulum* and so on. Few if any of these temporary names survive to-day, which is commonly the fate of popular names given to non-popular plants.

If you were to write to a nursery firm and request them to send you a dozen 'red hot pokers', you *might* get kniphofias. On the other hand you might not. Most likely you would get a tactfully worded letter back, saying that the firm would be charmed to be of service to you, but could you be a little more explicit?

If you then asked for a dozen kniphofias (cash with order) I have no doubt you would receive them by return of post.

The pitfalls of 'common English names' are so obvious, that it is hardly necessary to stress them. If you asked an English nursery firm to send you 'bluebells' they would naturally send you hyacinths — *Scilla nonscripta* is our common woodland 'bluebell'. But if it happened to be a Scottish firm, they would be more likely to send you campanulas — because *Campanula rotundifolia* is the 'bluebell' of Scotland; the English call it 'harcbell'.

If you wrote to a nursery in Tiflis or Prague or Tokyo (there *are* nursery firms there) and requested them to send you plants of *Arisaema*, I have no doubt you would receive a favourable reply, and the right plant. But if you asked for 'cuckoo-pint' they would request clarification.

So far as botany — and horticulture — are concerned there is much in a name.

Then there are weeds. But what is a weed? Definitions, which are rarely more than examples, are tiresome. Never do they include all possible starters; sometimes they include more than they should.

Nevertheless, what *is* a weed? Of course we all know what *we* mean by a weed, but a definition which will cover *all* weeds and nothing but weeds is as difficult as a definition which will include all alpine plants and nothing but. It is more epigrammatic than true to say that a weed is a plant growing in the wrong place, or that any plant in the wrong

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place is a weed. Wrong place for whom, or what? The plant at any rate does not necessarily consider itself in the wrong place! *Ranunculus Lyalii*, one of the most beautiful New Zealand alpine, growing on an English rock garden, is surely 'in the wrong place'. We don't think so; but it might. Does that make it a weed? If so, it has changed its status since it left New Zealand; for nobody regards it as a weed in its homeland. But the 'water hyacinth' of India and Burma, though it has evidently found the right place, is none the less a weed. To most of us a weed possesses two attributes: (i) it is ugly, or at least plain — the layman might say it had no flowers, although of course it has really, but they are small and green like the flowers of a sting-nettle, hence inconspicuous; and (ii) it is common everywhere and particularly where it is least wanted, in flower beds. But it is not the possession of small and insignificant flowers which constitutes weediness. Many plants which have inconspicuous flowers are certainly not weeds. On the other hand, some plants which have quite beautiful flowers are weeds — and dangerous weeds. The so-called water hyacinth (*Eichornia*) already referred to, a South American immigrant, is a good example. It is pervasiveness, the insatiable urge to go everywhere and grow everywhere, rather than good or bad looks that turns a respectable plant into a disreputable weed. If a plant will grow anywhere and everywhere, not only where you want it to grow, but also and more especially where you don't want it to grow, it may be regarded as a weed. Most proletarian and cosmopolitan plants are weeds somewhere.

Few gardeners would deny that there are too many 'named varieties' too much alike. I say nothing of roses, daffodils, dahlias, chrysanthemums, orchids, and other florists' flowers. They are in a class by themselves. The layman cannot see how the 1947 models differ from the 1946 models and naturally believes that the 1946 models have merely changed their names, not their spots. But if you

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could compare the last rose show of the nineteenth century with the rose show of say 1950, you would certainly notice a remarkable difference. The only question now is, has not perfection already been reached? To boost new roses merely because they are different may be a step backwards.

However, confining ourselves to rock plants we find the same embarrassing variety, from which we wish to select only the best. For example, in a recent book on rock plants I find listed under the well-known *Saxifraga Burseriana* no less than eight hybrids and varieties from pure *S. Burseriana* to impure *S. × Burseriana magna*, all named, all not very different, all described in superlatives, all highly recommended. The chief differences are in the size and colour of the flowers, the colour however only ranging from ivory white to pale sulphur.

Then there are the violas, especially those which we used to call pansies, such as *V. gracilis*, with six hybrids and varieties, all *gracilis* or \times *gracilis* (which symbol, by the way, means hybrid). Here, however, there is a greater range of colour, though a smaller range of habit.

One has only to read through an average nursery catalogue to find many examples of this duplication. Some are legitimate since they connote variations easily appreciated by the public, especially differences of colour; but not all.

Tastes differ. Some people prefer one colour, some another. Many don't care, being colour blind. Some people like their saxifrages as big as saucers or even soup plates; others like them best when so small as to be scarcely visible. The beginner, looking through a catalogue in which all geese are described as swans, is bewildered. He has been told perhaps that he ought to grow *Saxifraga Burseriana*; now he begins to wonder which of the many *Saxifraga Burserianas*?

One would expect a few varieties to hold the field. When an improved variety was produced, one of the others would gradually be replaced and drop out of circulation, the best

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remaining. Why grow a poorer variety of a plant when a better one exists?

But — better how? Larger flowers? — they may be accompanied by a poorer constitution. More brilliantly coloured flowers then? — they may indicate greater susceptibility to disease. Neater foliage? — more relished by slugs perhaps. A different habit? — but possibly less hardy. In short, there is no knowing what invisible changes may be denoted by external signs; the whimsicality of correlated characters is fathomless. Some plants are sickly, others robust; some adaptable, others unbending. In fact they are very like human beings. But also, like human beings, they rarely show how tough they can be by any outward sign; or if they do we have yet to recognize the sign.

Only trial and error — many errors — will teach what external change if any stands for what internal change. That is one good reason for keeping apparently inferior forms. But it is no excuse for nurserymen to describe inferior forms as equal to the best.

However, not everyone wants larger and ever larger flowers. We are a conservative people; large flowers sometimes offend us when we have grown thoroughly accustomed to smaller ones, associated in our minds with neatness. There is nothing sacrosanct about size, although it may be an advantage to produce the highest flower pressure consistent with elegance. Yet there must be some limit, and I for one have no desire to see chrysanthemums as big as hassocks, or saxifrages as big as chrysanthemums.

One does feel then that a drastic pruning of named varieties would be an advantage. Many seem to be superfluous — just names. It is not without reason that one asks — What's in a name?

CHAPTER VIII

TO PLANT OR NOT TO PLANT?

MORE important than the rocks which make the warp of the rock garden are the plants which are, as it were, the woof, growing on the rocks, threading their way amongst them, nestling against them. The two together, intimately associated, each essential to success, should combine to form a rich fabric of many colours. I have no intention of making an alphabetical list of rock garden plants in cultivation. A selection of these will be found in any good book on rock gardening — it forms indeed the bulk of Farrer's *English Rock Garden*, with colourful descriptions and critical notes in his own inimitable style, as well as in many a nursery catalogue; although probably a thousand species and varieties have been added to our rock gardens since that work was completed. I do, however, intend to say something more about rock garden plants in general, for the benefit of the enthusiast constructing his first rock garden.

The main object of a rock garden, apart from every man's wish to create a work of art, is to cultivate those plants which cannot be grown anywhere else — except of course in pots and pans. There are a great many of these born rock plants, mostly alpine, or plants of temperate lands. Indeed, modern rock gardening has enormously increased the number of plants in cultivation.

But plants which can be grown elsewhere, and which in nature do grow elsewhere, are also eligible; in fact the rock garden may be more suitable than any other place for them. Otherwise they may be at least as well suited to the rock garden as they are to their normal surroundings, such as meadow and moor. The rock garden was conceived in the first place for the cultivation of *rock* plants — plants which, in the absence of such a home, would be grown, if at all, in

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pots and pans (probably under glass), on walls, or steps, or between the paving stones of a path. But there is a tendency, as rock gardening expands, to enlarge its scope, to prepare sideshows, bog, scree, alpine meadow, in order to embrace the cultivation of still more plants, which are not strictly rock plants at all.

This is all very well, so long as the nucleus of the rock garden remains honest rock, and a fair proportion — say 70 per cent — of the plants are rock plants. I don't want to be pedantic. However, I strongly advise the artist who wishes to build a rock garden, particularly if it is a small one, to cover it in the first instance mainly with rock plants.

The modern fashion is to include every small plant worthy of cultivation — and a few which are not — and call them all rock garden plants. This is wrong. I have already said that plants which grow elsewhere than on rocks may be eligible for the rock garden — a great many in fact are. But the criterion of suitability is not size alone, important though size is. There is also shape.

Personally I think the English primrose (*Primula vulgaris*) looks infinitely more beautiful growing on a grassy bank in some deep Devon lane, or carpeting a Kent copse, than it ever does in a rock garden, however well placed. English violets too look better in an ordinary bed, or on a bank. Yet both are commonly regarded as fair game for the rock garden. To say that they are quite unsuitable would be going too far.

On the other hand there is no question that both snowdrop and crocus, though listed in all books on rock gardening known to me, are definitely not rock garden plants. Of course they will grow, and grow well in the rock garden. It may even be granted they add a certain charm to it. Is there any place to which they would not add charm? But to see them at their adorable best one must see them sprinkled through the short turf under the leafless trees! Or mingled with the shadows on the bare earth beneath a

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Lebanon cedar! After such glory many would say it were sacrilege to waste them in the rock garden. Nor is there any lack of rock garden plants, that we need call up all our reserves, non-combatants included, to fill the breach.

So far as size is concerned, the plants named above are admirably suited to the small rock garden; nor is their habit or form, though not that of typical rock plants, a bar to their acceptance. I do not condemn them because they are not by nature alpinists or rock plants. That argument, which springs from a false analogy, may be ignored. Many good rock garden plants, such as *Muscari botryoides*, *Narcissus bulbocodium*, *Iris pumila*, *Oxalis Acetosella*, *Parochetus communis*, are neither alpinists nor rock plants. The sole reason I disqualify them — and I would fain add *Chionodoxa* and *Cyclamen*; *Colchicum* is disqualified for other reasons — is because the rock garden does not display them to the best advantage. *Chionodoxa* and *Cyclamen* too look delicious springing up under the lace of the trees, but have perhaps some claim to a corner of the rock garden; on the other hand the colchicums are too untidy in foliage, after the flowers are done, and demand grass to hide their skeletons.

In deciding the type of plant best suited to the rock garden, we can hardly do better than explore cliffs — any cliff anywhere in the world will do — for rock plants, and after eliminating those we know to be indifferent where they grow, only choosing cliffs if there is nothing better to be had, concentrate on those which appear to grow on the cliffs from choice, or because they are unable to grow elsewhere.

These are likely to be mostly herbaceous perennials; a few will be undershrubs, or prostrate creepers.

The majority will probably conform to one or other of several forms which are easily recognized, namely:

- (i) mat plants;
- (ii) cushion plants;
- (iii) sponge plants;
- (iv) rosette plants;

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- (v) tufted plants;
- (vi) creepy-crawly plants.

It does not matter where the cliffs happen to be, whether on the Mediterranean coast, in the Austrian Tyrol, in North Wales, or in the 'Burmese Oberland'; the same types of rock plants reappear again and again, with, of course, a certain number of normal plants belonging to none of the above groups.

As an example of a mat plant, take the common English thyme, or better still, *Arenaria balaerica*. These form thin flat mats of interlacing thread-like stems, which continue to grow outwards in all directions. Many common English wild flowers have creeping prostrate stems — moneywort or creeping jenny (*Lysimachia*), and the ivy-leaved toadflax (*Linaria*) are good examples — but do not form mats.

Cushion plants form solid hassocks composed of short, erect, closely branching stems clothed with tiny needle leaves, all tightly pressed together. They are commonly met with in the alpine regions of the Himalayas and mountains of western China, and include one of the most lovely of all alpine plants, *Myosotis* (*Chionocharis*) *Hookeri*, and the delightful *Arenaria polytrichoides*. Neither is in cultivation.

Rosette plants are legion, nor need one go to the mountains to find them. Much nearer home is the common dandelion, which forms a flat rosette of foliage, from the centre of which springs the flower. More compressed examples, amongst the Compositae, and also amongst Umbelliferae, the flowers, almost stemless on the rosette, are known from the Himalayas and other high mountain ranges. Rosette plants are common in sandy soil also.

Tufted plants are common enough on the sea cliffs of England, the bladder campion (*Silene maritima*) for instance, sea pink (*Armeria maritima*), and many more.

Examples of all the above will be found amongst the saxifrages, well over a hundred species, hybrids, and varieties of which are in cultivation: also amongst the





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sedums and sempervivums, and other large genera. But many excellent rock-garden plants do not fall into any of the above groups, for instance, dwarf iris, narcissus, dwarf species tulip, many gentians, and so forth.

Why, it may be asked, are narcissus and iris admitted to the rock garden if crocus and other spring bulbs are not? It is always difficult to give logical reasons in matters of art. I doubt whether there is any other place where dwarf irises look so neat and becomingly placed as amongst rocks. But anyway it is chiefly a question of taste, or even preference. England is still a free country, and since it does not harm your neighbour if you grow snowdrops and crocuses in your rock garden — by all means grow them if you think fit. But I need not encourage you to do so.

The rock garden is no place for annuals, although many expert rock gardeners, especially those who maintain large gardens, would disagree, and most catalogues list a few. One reason why the small gardener is advised against them is that he has not the necessary space. He is strongly advised to grow a high proportion of mat, rosette, and cushion plants, together with masses of sponge plants like aubrietia. That is to say, he should to begin with grow as many unmistakable cliff plants as possible, not only because these are the very plants which make it look like a rock garden, but also because they are the very plants which will grow nowhere else. It is absurd to build a rock garden and then fill it with plants suitable for the herbaceous border.

The rock gardener's ultimate object is to have colour in the garden at every season of the year, though no one will blame him if he concentrates at the start on having a rich display in the summer, which after all is the most enjoyable season to be in the garden. Yet as he gains experience he will be certain to turn his attention more and more to the provision of colour in autumn and winter. Incidentally, annuals are so rare in the alps of south-east Asia that they might almost be said to be non-existent.

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Plants with double flowers, including of course roses, are not wanted in the rock garden either. All the plants grown should be as natural as possible, and though hybrids are admitted by special licence, and have gradually become indispensable, the licence is not extended to double flowers which, if they look well at all, look much better in beds of their own, or in the herbaceous border.

Also tabu are obvious desert plants, whether armed, like cactus, with hedgehog-like spines, or swollen in leaf and stem as though suffering from water on the brain. The rock garden is not a desert, and should not be asked to support plants of the desert, however quaint. The warning is salutary because there is a strong temptation to nail some of these curiosities of vegetation to the rocks. Many of them are the right size, and the right shape, and the idea of seeing a mamillaria sticking a bristly nose out of a rock crevice is not unpleasing. Nevertheless, don't do it.

The size of plant admissible to the rock garden depends mainly on the size of the rock garden and of the constituent rocks, as already remarked. Trees, even small ones, are of course out of the question. Overhead shade there must never be; only such shade as is provided by aspect. But shrubs, particularly dwarf shrubs, and those of prostrate or spreading habit, are invaluable. Only the dwarfest shrubs can be admitted to a small rock garden — *Salix reticulata* which has the advantage of being extremely slow growing. *Cotoneaster horizontalis*, *Rhododendron myrtilloides* — another laggard grower — and several more may be mentioned. Some large rock gardens are devoted almost entirely to shrubs, and in particular to rhododendrons. As regards size, as a general rule the rocks should be larger than the shrubs, to preserve the right proportions. A few small berrying shrubs belonging to such genera as cotoneaster, berberis or lonicera may be grown, except on the smallest rock garden, for the sake of their coloured leaves, or fruits, or both, in winter when colour is hard to come by. Dwarf trees are commonly admitted at

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least to large rock gardens, but in my opinion are indefensible. They always remind me of what we used to call a 'Nor's ark'. The dwarf cupressus in particular, charming little trees as they are, have a distinctly 'Norish' look. If you *must* plant upright dwarf trees in the rock garden, at least plant them amongst rocks taller than themselves.

There is a class of rock plants in cultivation well called invasive, which must be handed tactfully. To the beginner they are rather a godsend because they continue to grow in spite of him. However well or ill he cultivates them or actively maltreats them, the invasive plant — weed if you like — invariably triumphs. Not merely does it continue to live, but in the modern war-time phrase it retains the initiative. Sooner or later the gardener comes up against the invasive plant, almost one might say the invader, only it is an assisted immigrant to the rock garden. At first he fails to recognize it as such; but not for long. After he has been gardening for a year or so, he notices that there are at least one or two plants in his little collection he need not bother much about. Then, if he is observant, he begins to realize that they need snubbing — they are a bit too pushing. So he snubs them, gently, with a trowel. The effect is negligible; already they are encroaching on areas reserved for other plants. Finally he decides that unless he takes the most drastic steps, and that swiftly, these aggressors will overrun his entire rock garden, shouldering all other plants rudely out of the way, or smothering them boisterously like a green wave. A perfect example of a slow invasive plant is the charming little *Arenaria balaerica*, its thin, bright green mats twinkling with tiny white stars in June. Once established, and it is easy to establish, it forges ahead, and is so delightful that one hardly notices the iron threat beneath the green velvet skin. It is like a creeping paralysis. *Veronica filiformis* is another infiltrator of the deepest dye. It is a most attractive little plant, and therein lies the catch. Others as *V. saxatilis* and *V. repens*; also some species of *Oxalis*. The

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experienced gardener is on his guard against the out-and-out invader, where the novice is captivated by its undeniable charms. He either excludes them altogether from his rock garden or more probably outwits them. When they try infiltration tactics he is utterly ruthless. Thus far and no further, he says; and says it with spades. The plants mentioned above are not difficult to deal with. But amongst the polygonums are some tough species which can take it. Beware polygonum. Beware also *Campanula rapunculoides*. You have been warned.

CHAPTER IX

TABU

THE heading of this chapter looks like a greeting in Malay. It is really a religious prohibition — a sort of THOU SHALT NOT, of tribal gods. In the last chapter I mentioned certain groups of plants which are unsuitable for the rock garden; I will now say something more about forbidden fruit. Anyone who likes to exercise his rights as a free-born Englishman and ignore every tabu is of course welcome to do so.

According to the best catalogues there are some plants no rock garden should be without, but I suspect that many people ignore this solemn advice and go without them, or without some of them, suffering no visible ill effect as a result. But it is equally certain that there are some plants no rock garden should possess — plants unfitted by nature for the exalted position. Admirable though they may be in other spheres, they do not happen to suit the style of the rock garden; and the only result of forcing them to live above their station in life is to make the entire company feel — and look — thoroughly uncomfortable. After all, in their proper setting such plants are often first rate; so keep them there.

Undoubtedly some plants look best in a two-dimensional, others in a three-dimensional set-up.

Amongst the more glaring misfits which have no business in *any* rock garden are trees, annuals and biennials, all double flowers, and xerophytes or other desert vegetation. For the outcrop rock garden one may also utter a caution against shrubs, however alpine, invasive weeds, however beautiful, and bulbs, however bulbous.

It would hardly be necessary to mention trees which for obvious reasons are quite unsuited to the rock garden were it not for the fact that there are border-line cases — dwarf

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trees, pygmy trees, miniature trees. We all know that trees cast shade — to be avoided in the rock garden like the plague — are greedy, especially for water, and disrupt foundations, their roots gradually undermining the most solidly placed rocks. Moreover they drip. Finally the size of even a small tree as ordinarily understood is hopelessly disproportionate not only to the largest rocks, but to the outcrop rock garden as a whole. After that one need say no more about ordinary trees. One cannot, however, ignore the existence of dwarf trees such as the Japanese produce. Some of these are just the right size for a big rock garden. Are they to be disqualified because they are in reality scores of years old and technically trees? No, they are disqualified on other grounds — because they are freaks, almost one might say cripples. They are curios of the plant world, fit only to be placed in cabinets, or the horticultural equivalent, and worshipped with awe; freaks deformed at birth to make a false appeal to sentiment, as Indian children of the beggar class are said to be deformed at birth by their parents that they may the more easily arouse sympathy.

What have these monstrous caricatures of trees to do with the youth and vigour and beauty of the English rock garden! In their gnarled and shrivelled limbs, in their stout but wizened trunks, not even juvenile in outward form, senile within, seems to be concentrated all the wisdom and cruelty of the East. Oh! but, you say, they are perfect in every detail and just the right size. Perfect in every detail! If that is true then indeed are they damned for all time. They are not trees, which would be bad enough on the rock garden, but models of trees, which would be bad anywhere; an infinitely worse thing.

Well then, if Japanese dwarf trees are inadmissible, what about those other pygmy trees, natural Tom Thumbs, dwarf cypress and their kind? Surely you won't condemn them! I hear the critic say, rather aghast. I reply: so far as the rock garden is concerned there is little more to be said for

them than can be said for Japanese dwarf trees. They may be natural forms, but what of it? It only shows that nature will mock at anything if she is in the mood. Tom Thumb trees have less the appearance of violently arrested growth, look less in need of an immediate surgical operation; but they cannot escape the suspicion of having just come out of a 'Nor's ark'.

The prostrate varieties such as *Juniperus horizontalis*, *J. procumbens* and the like may be grown on any rock garden large enough to assimilate dwarf shrubs amongst its rocks; but the small outcrop rock garden can only take in one or two prostrate undershrubs and these should certainly be scarlet berried — cotoneasters or berberis, for example. Conifers hardly belong in the rock garden, anyhow. They add too sombre a note and come very close to being tabu. Dwarf willows and honeysuckles are another matter.

The several forms assumed by genuine rock plants have been referred to. When trying to decide which of two plants to secure for your own rock garden, bear in mind that the hall-mark of excellence is suitability, that is to say, the best plant is that which best goes into partnership with the rock, till the two are knit together as one; other things being equal, that is the plant to choose. This is no doubt a council of perfection and can only be achieved, if at all, by trial and error. Much of the charm of rock gardening lies in experiment. To avoid a continuous veneer of vegetation crisply lacquering the rocks without a ripple, the smooth crust of creeper and mat should be abruptly cracked here and there by tufted plants projecting themselves from concealed crevices, interrupted again by scattered drifts of small stiff plants such as iris, muscari, anemone, and by the swell of cushion plants. Contrast should be aimed at, but one must not be violently conscious of contrast. Individual erect plants should be no taller than the rocks amongst which they grow. They should from any position always be seen against a rocky background, in so far as this is possible, when you must inevit-

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ably look down on them from above. At least, they must never be ranged along the crest of a ridge like a file of guardsmen; for remember in a small rock garden in flat country you can only view your plants from above, never from below, as one so often can in the mountains. Nor ought they to be too rigid. Their charm is increased if when the breeze sways them they ripple gently, as wave after wave of colour sweeps over them. Best of all are those with firm but slender stems whose hanging bells swing mutely, scattering fragrance, such as *Primula alpicola* and *P. sikkimensis*. Tall lanky plants have no business to be in the rock garden — which rather damns the wand flowers (*Diarama*); anyhow, these have no scent and are no great loss. If tall plants, so popular in the rock garden of to-day, combine a sort of stately beauty with primness, as too many of them do, they are doubly damned. Most species of *Meconopsis*, for example, are too utterly stiff and haughty for the rock garden. As they look down on the milling friendly crowd at their feet, their air of icy disdain is almost unbearable. They are commonly grown in the rock garden because they are alpine — indeed, many of them are genuine rock plants; an excuse, as we have seen, for growing almost anything. But most of them would be better banished to other pastures. *Meconopsis latifolia* and *M. Wallichii*, both with heavenly sky-blue flowers, and *M. violacea*, the silken violet poppy of north Burma, are too tall for any rock garden not hewn out of a cliffside. Moreover they are biennial, and biennials, like annuals, are tabu. On the other hand the dwarf form of *M. integrifolia*, if it could be guaranteed to stay dwarf, the cliff-haunting *M. bella*, if it could be persuaded to grow at all, and the scree-loving *M. impedita*, if we could build a scree which would suit it, may pass as rock garden plants. So also may *M. quintuplinervia*. This, besides having flexible stems which allow the bubble-like flowers to float gracefully, is perennial; but its colour does not compare with that of the best Himalayan poppies. As for the incomparable breath-taking Burmese blue poppy

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M. betonicifolia pratensis (which means of the meadows), it is wasted in the rock garden. It must be grown in vast solid drifts, or in broad winding ribands beside a stream, or in solid sheets, to get the full shimmer of its matchless blue.

Meadow primulas like those mentioned above, with firm but flexible stems short enough to be grown even in a small garden if damp spots can be found, are welcome; but *P. Florindae* is too robust, and the stiffer 'Candelabra' primulas *P. helodoxa*, *P. burmanica*, and even the smaller *P. chungensis*, are too tall for any but the large rock garden with sideshows. Besides, it is a sad waste of space to grow meadow primulas singly — as one must in a small rock garden; they must be grown in wide windy drifts to do them justice.

For the small outcrop garden there are other primulas, some with hanging, some with upright flowers, for example, *P. rosea*, *P. denticulata*, *P. yargongensis* and many more, besides many desirable but unprocurable dwarfs. Those just mentioned are not difficult to grow, their height does not exceed a few inches, and they are all gems of the first water. No rock garden would be authentic that did not contain some primulas.

Next on the list of expurgations are annuals and biennials. One may admit that the self-sown annual is sometimes a godsend, especially in the early stages of rock gardening, when we gladly turn a blind eye on it. But it must be resisted at all costs later. Many books and most nursery catalogues list a few, bestowing the usual fulsome praise ('indispensable for the rock garden'). Resist temptation and dispense with them. I am aware that many experienced gardeners with large rock gardens grow at least a few annuals and especially biennials, including any *Meconopsis* they can lay their hands on, just because it is *Meconopsis*, which in their eyes can do no wrong. The beginner is advised not to follow their example.

There are several grave objections to using these short-

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time plants in the rock garden, but the final and unanswerable objection is that they don't move with it. They are in the rock garden but not of it. They come and go like migrant birds; thus they are but ephemeral visitors separate from the rock garden community, not sharing its joys and sorrows. Nor have they any need to trespass, having a claim on other parts of the garden. They will grow, and grow better, without rocks. Never can they weave themselves into the fabric spun by rocks and plants together, as the seasons come and go and the years revolve; their life is but a shadow. The annual which comes up the first year when your garden is new and raw and the other plants no bigger than it, will look exactly the same ten years later when rocks and perennial plants have settled down together, welded by time into a single living organism; intruders always. It is true the biennial *Meconopsis* have two quite distinct phases, producing a rosette of leaves the first year from the heart of which springs the flower scape the second year. But neither phase can ever enter into the communal life of the rock garden. Their hollow stems and roots match the hollowness of their pretensions.

As remarked above, a few annuals and biennials are sometimes grown by the best people; but unless you know them intimately they won't tell. After disposing of annuals, let us turn and rend the whole tribe of double-flowered varieties. All florists' flowers are tabu. You must not expect to get cut flowers for the boudoir off your rock garden. And first on the list of the blackballed are double flowers. However suitable the plant may be otherwise, if it has double flowers it can have no place. Personally I consider most double flowers are hideous, and would not grow them at any price anywhere, but there are of course obvious exceptions. Nobody would be so naive as to damn double roses, or chrysanthemums, although a single wild rose (but not a single wild chrysanthemum) has an ethereal beauty which no cultivated rose can surpass. Yet the majority of double

flowers have lost far more than they have gained — for they have lost the beauty of form.

There are a great many flowers — chrysanthemum, dahlia, and rose are good examples, but anyone who knows our wild flowers can think of others — which can be cut in half in the vertical plane in almost any direction and the two halves will match one another. They have what is called radial symmetry. Others, however, can be cut vertically in half in only *one* direction so as to give two identical halves; for example, sweet pea, larkspur, snapdragon, and nasturtium. These flowers, as anyone must admit, owe much of their charm — apart from colour and fragrance, to their highly original form. Who has not marvelled at the daintily spurred columbine, the butterfly-shaped sweet pea, the pouting snapdragon and at the flowing curves of the trident iris! Double any of these, and you wash out that exquisite beauty of line as a flood washes out the graceful curves of a river, merging them into a single shapeless sea. No longer do they suggest butterfly or dragon's maw, even the spur is lost; they have become void and without form.

Now beauty of line and of form in the rock garden has high priority, and to lose such an opportunity by sacrificing the rich treasure of shape afforded by flowers themselves — the very stuff of rock gardens — is wicked. Nature's taste is often questionable. Perhaps it would be truer to say that nature has *no* taste, good or bad. It is we who have taste; we can discriminate. We ought to improve on nature's work, not lower her standard. That is why I repeat, and repeat again — banish all double flowers from the rock garden. Any plant you see mentioned in a catalogue which has the words *flore pleno* or *fl. pl.* added after it should be avoided like the plague. Scrap the lot.

Thirdly, there is a qualified ban on using bulbs in the rock garden, mainly because they can be used with so much more telling effect elsewhere. It may be argued that if the supply is unlimited, the rock garden might as well claim its

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share. But if a plant looks perfect in one framework and less perfect in another it is a mistake, albeit a minor one, to lower the standard by placing it in an inferior position.

Although the rock garden as a whole is in three dimensions the most rockworthy plants are those which grow in two only — length and breadth without thickness. Those which grow upwards rather than sideways — and most bulbous plants do — should be used sparingly and with set purpose. It is of course of no significance in this connection that bulbous plants are rare in the alps. As a matter of fact most bulbs come from semi-desert or at least arid regions, and if not actually rock plants, often grow amongst rocks in stony deserts. South Africa is remarkable for the number of bulbs in its unique flora. The whole of the Mediterranean region with its eastward extension across Persia and Baluchistan to north-west India is likewise arid, and to some extent a land of bulbous plants. But the fact that they grow amongst rocks is not in itself a valid reason for growing them in the rock garden, any more than the fact of their growing in deserts is a valid reason for excluding them, since they are not obvious xerophytes.

A bulb is simply a storehouse of food. Thanks to this hoard, early in the year the shoot grows rapidly into the air while roots grow equally rapidly into the soil; then flowers, and eventually leaves, are formed all within the space of a few weeks or months. When the plant has reached its allotted size, depending on the size of the bulb, whether it be a few inches or a few feet tall, it ceases to grow in height. Its job now is to put by enough to make a new storehouse or bulb, saving as much food as it can spare. Thus bulbous plants behave like annuals, sending up a new shoot each year. The same objection applies to bulbs, therefore, that applies to annuals; the plants do not truly identify themselves with the rock garden. They keep themselves *to* themselves.

A few bulbs look charming clustered on small earthen terraces half-hidden amongst the rocks, or in drifts at the

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foot of the crags; *Chionodoxa* for one. As they flower early, some of the crocuses even in winter, they are particularly valuable. Cyclamen too may be grown, as remarked already. But think how hideous the stiff, waxen-looking pot hyacinth would look in your rock garden! Yet it looks fine in its pot.

Lilies are popular plants to-day and will probably become still more so. However their stateliness alone disqualifies them for the rock garden. The last thing one wants in the rock garden is stateliness, and lilies are like Victorian great ladies, who were set up in social glass cases to be admired but not touched. Most lilies are far too tall for the rock garden anyhow. That is true of two other fine plants also, alpinists both of them, *Rheum nobile* and *R. Alexandrae*. The former rises from the grey waste of rubble on the roof of the world like the Pharos lighthouse; the latter suggests the one-time delicate porcelain pagoda of Nanking destroyed by the Taipings.

Finally, the rock garden must do away with the obvious xerophyte or desert plant, even though many of these are paramount rock plants. If you must cultivate the weird in preference to the beautiful by all means do so; but for heaven's sake don't mistake the one for the other. Besides, the background of desert plants should be desert, obviously; to grow them amongst surroundings which cry aloud of a 40-inch rainfall looks odd. True, many desert plants produce flowers which by themselves are beautiful; but when they spring from something that looks like a monkey's bottom much of the beauty is vain. There may be some judicious combination of the weird and the beautiful which is satisfying aesthetically; it is not likely to be found in the English rock garden. Nature isolates desert plants from ordinary everyday flowers; let us take the hint and quarantine them too. It is the easier because a damp atmosphere, necessary to most alpinists, is fatal to most xerophytes. And as for their grotesque shapes, especially those of the New World cactus family,

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they are jokes — or nightmares. They seem to go out of their way to imitate absurd things like rheumatic porcupines, hedgehogs with mumps, bristly teats of extinct mammals. All such derisive vegetables are tabu in the rock garden. Desert plants, especially the tall cacti of the Mexican desert, seen against their own austere background, have a crude grandeur. The naked colours of the desert stir the blood and are an unspoken challenge. But all this has nothing to do with the rock garden.

Nevertheless, as usual, the bald statement that xerophytes have no business in the rock garden needs qualification. Some plants typical of arid regions are not only suitable, but amongst the most suitable of rock garden plants. Of course there are degrees of desert. Under absolute desert conditions no plants can live. But absolute desert is the exception, and many gradations between the comparatively dry climate of the Mediterranean region and the stark desert of central Asia occur. Many Mediterranean plants, including some bulbs, are amongst the most distinguished of our rock garden plants. Amongst the sedums and sempervivums which are the backbone of the outcropping rock garden, fleshy leaves and stems are the rule — a sure sign that where they come from water is not plentiful nor drought unknown. A few other succulents, some of them rock plants, are worthy of the rock garden. And curiously enough succulents are not unknown even from places with a 90-inch rainfall, as species of *Kalanchoe* in the Naga hills (Assam). These, however, flower during the long rainless season when the air is moderately dry. None of the above depart so widely from the normal plant as to raise serious doubts whether they are plants or animals — or just stones. That is one excuse for admitting them to the rock garden.

Invasive weeds like polygonum are gently dealt with elsewhere.

And with these several warnings I may fitly close this chapter.

CHAPTER X

FAR HORIZON

At least 75 per cent of our rock plants (excluding hybrids) come from the alpine regions of the world. Most of them come from the temperate belt, so it may be helpful to say something about mountains in general, whence so many of our alpine plants are derived.

Whether in California or Japan, New Zealand or the Balkans, Colorado or the Himalayas, north Burma or the Andes of Chile or Peru, Yunnan, South Africa, or Switzerland, mountains above the tree line have many features in common. Hence the vegetative forms which plants acquire—though not the species—are apt to be similar no matter where the plants grow. Nevertheless, like as they often are in appearance, it by no means follows that because you can grow alpine plants from the Himalayas side by side with alpine plants from New Zealand in your rock garden, that Himalayan alpine plants would grow equally well in New Zealand. They might; but equally, or rather more probably, they might not. After all there are many New Zealand and Himalayan alpine plants which you can *not* grow. There are also a great many which neither you nor anyone else has tried to grow, some of them well worth growing too. Only a tithe of the alpine plants of the world are in cultivation as yet.

Great Britain is neutral ground for alpine plants from all over the world, where extremes meet—if not mate. All the mountains of the world from China to Peru, from the Tien Shan to the Drakensberg, are represented there; but try to grow plants native to Mount Cook or Mount Everest and you would almost certainly fail. Conditions may be similar, but they are not identical. Other factors also enter into the problem.

Stripped of non-essentials, the alpine region at least in the

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temperate belt consists of peaks and valleys, some of the valleys leading to passes between the peaks. However, we should make a poor showing in our description of mountain scenery unless we carried our analysis further than that. A geographer for example might analyse the alpine scene somewhat as follows.

THE ALPS

Main Features: Peaks; Passes; Valleys.

Minor Features: Cliffs; Gullies; Alluvial fans; Screes.

Glaciers when present give rise to:

Glacial Features: Moraines; Hanging valleys; Rock basins and Lakes. Many of these glacial features persist after the glaciers have disappeared, but the lakes are then apt to be replaced by marshes, or become completely silted up to form meadows.

In the rock garden all these minor features, as bogs, screes, and so on may be classed as sideshows. In nature they are the result of weathering, or arise from the sculpturing of the hills by running water or by slowly moving glaciers acting on a variety of materials, hard and soft, compact and loose, crystalline and non-crystalline.

Each type of structure and even each kind of rock has a flora of its own and perhaps a few species peculiar to it; but most species are widespread — not confined to one type of rock or situation.

Anyone bent on building a rock garden is advised to study mountains on the spot with a view to understanding the evolution of scenery, and the features here described, and how they came to be. Apart from its usefulness it is an enjoyable exercise.

Suppose you move a plant from its alpine home on an alluvial fan to your rock garden, you must make some attempt to treat it in the way it has been accustomed to live — and generations of its ancestors. You cannot give it

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identical treatment, but you can get somewhere near it, except in the matter of climate which is beyond your control.

Nor does that matter very much. Every plant has a certain range of tolerance and within the limits of that range it will live. Beyond them it will not survive indefinitely. For some plants, e.g. *Verbena officinalis*, an English weed, tolerance is an elastic term covering a wide variety of conditions; this plant grows as well on the plains of Assam, and on the plateau of Tibet, as in an English pasture. Other species have a much narrower range of tolerance and so are far less widely distributed. Hence if the conditions to which they are accustomed are not faithfully reproduced they die. It appears that widely distributed plants such as *Iris unguicularis*, which is found right round the Mediterranean basin and eastwards, are likely to prove hardy; while plants of restricted distribution or those which grow in one locality only, like *Veronica lanuginosa* at 17,000 feet in the Himalayas, or *Ranunculus Lyalii* from New Zealand, are not hardy; and this seems reasonable. Further, plants from temperate latitudes are hardier than those from extreme latitudes; hence those from moderate altitudes, other things being equal, should be hardier than those from extreme altitudes. This agrees on the whole with experience.

The collector-gardener who on an alpine holiday gathers specimens for his garden must note whether a plant prefers cliff or valley, scree or meadow, what these situations imply in the way of soil, drainage, exposure, and so on — in a word, what are the living conditions. This brings us as rock gardeners, to

SIDESHOWS

Not content with a rock garden made of rocks for the purpose of growing rock plants, the modern gardener has added sideshows for the purpose of growing herbaceous perennials and dwarf shrubs generally.

The first addition was water laid on, running water; not

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only for growing water plants but also to add an air of verisimilitude. It would seem impossible to banish the idea that the rock garden does, in the last resort, represent, on however minute a scale, the eternal hills. Now mountains are the source of torrents, cascades, and similar turbulent manifestations of moving water; hence the rock garden also must display these things — so runs the argument — in order to strike the authentic note. I have from the beginning combated the idea that the rock garden represents a mountain scene, but one need not deny it water on that account. Tumbling water is pleasant to hear, delightful to see, cooling to touch; it can tumble quite naturally through the rock garden just as it can tumble naturally off the roof. Apart from its soothing qualities it has the further advantage of enabling us to grow certain plants which we could not otherwise grow.

In the mountains not only are there torrents and waterfalls but, as we have already seen, glaciers, bogs, lakelets, scree, and other peculiar alpine features; above all boulders and gravel, boulders and gravel, everywhere more and ever more as we ascend, until at last there is nothing *but* rock, an aching wilderness of rock and gravel and saw-edged cliffs.

Although each location has its own special community there is not really so much difference between the plant communities as one would expect, because there is not so much difference between the locations as one would expect. Few plants are absolutely confined to any of them. Bogs differ from scree and scree differ from cliffs; but the difference is mainly in appearance. The plant community also differs little in kind, though considerably in degree. Thus a pasture may be stained purple by dwarf asters, which are so numerous as completely to mask the few yellow primulas, crimson *Pedicularis*, and blue larkspur scattered amongst them; while a nearby scree is yellow with primula, amongst which asters and larkspurs are scarce, and a patch of turf across the valley is blue with larkspur and crimson

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with *Pedicularis* by turns. There are plenty of hidden boulders beneath the soft surface of the bog, or under the waving sea of green meadow whose surface is many-hued with bobbing flowers, besides those visible on the screes, moraines, and alluvial fans; so it is not really surprising that three-quarters of the alpine flora can be found almost anywhere in the alpine region. A few uncommon species do seem to be confined to special localities. On the other hand one would not look for bog plants on the cliffs, or vice versa.

So it would seem that much of the precious talk about accurate mixtures for alpinists — $\frac{1}{4}$ granite chips, $\frac{1}{4}$ cinders, $\frac{1}{2}$ silver sand and so on is voodoo; as indeed I have always regarded it. The absolute essentials are: enough but not too much food, and enough but not too much water at the right time. Good drainage and plenty of light, and fresh air are also important. One must not ignore the significance of the vast accumulation of loose rock in the alpine region, due to lack of transport. As a result of violent weathering and almost no vegetation there appears to be very little soil formed. Actually there is more soil than meets the eye, but it is hidden beneath rock debris which accumulates faster than it can be removed. This loose rock forms a protective cover over what soil there is. In fact, the alpine region is one of the few places in the world where the soil is not being either rapidly exhausted or rapidly denuded. Alpine plants are certainly on the increase as soil accumulates.

Sideshow in the alps do not occur just anyhow. There is design in the mountains and an orderly evolution, for all the apparent chaos. All of them depend on excess of weathering over transport. The features about to be described bear a definite relationship to one another. For example, screes are only associated with cliffs, moraines with glaciers, while meadows occur at the foot of alluvial fans, or occupy silted-up rock basins formed by glaciers. Thus to crowd them all into the limited area of a small rock garden without con-

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sidering their special relationships is unnatural and not, as many people think, a good imitation of nature.

However, by paying attention to a few broad principles, most of these sideshows can be incorporated into a large rock garden without doing violence to anything, whether for the sake of contrast or for the sake of cultivating special plants.

In times of drought sprinkle your garden as evenly as possible. With regard to water generally, we are usually taught to water our plants in the evening, not during the heat of the day. But so far as rock gardens are concerned it is during the heat of the day that water is most precious. Alpine plants spend much of their growing lives in a mist bath, visible or invisible, and water in the air is as vital to them as water in the soil. The simplest way to get the air around your rock plants humid is to water the soil when the sun is shining, and lay the dust. Of course some of the water will sink in, and some may run off, and much of it will be quickly evaporated and probably carried away if there are air currents. Still it will do some good.

A better way perhaps is to keep at least the barest patches covered with a mulch of wet vegetable debris. However, don't forget that the soil is rarely so dry as it looks, and that on the whole you are growing hard boiled sun worshippers, not milksops. Their need for water is not great. If you have a stream, pond, bog or lesser body of land based water, you can of course grow some of the plants — including alpenes — which respond to those conditions. Or you may construct a series of small cement basins at different levels, keeping them filled with water — though nature will probably do that for you. Then you can grow aquatic plants to your heart's content.

But there is no room for these sideshows in the small outcrop rock garden described in the foregoing pages. Nevertheless, their place in the modern rock garden deserves a few words.

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THE MORaine

A curious confusion exists in the minds of many gardeners as to the meaning of the terms moraine and scree; some people seem to regard them as interchangeable terms, others apparently have never heard of the term scree, and call any gravel slope a moraine.

In nature a moraine is sterile ground, nor is this surprising when we consider how it is formed. Moraines are only found where there are, or have recently been, glaciers. So long as the glacier is still active—even if it is retreating—a moraine consists mainly of ice with a covering, thicker or thinner, of earth, gravel, and stones. Lateral moraines appear as long ridges flanking the glacier; they consist mainly of ice, covered with a veneer of stones fallen from the cliffs above and carried along by the slowly moving glacier, so that though the stones fall only at a few points, they are spread along the length of the glacier. Lateral moraines, being actually on ice, and made of ice, are completely devoid of life; for while the crest of the moraine may be ten or twenty feet above the surface of the glacier, most of the apparent stone bank is really ice — ice which is protected from melting by earth. But in the Chinese alps I once came across an ancient lateral moraine covered on one side with turf, on the other with rhododendron scrub. This moraine had long ago been abandoned by its parent glacier, which was dead, and had subsided gently as the ice melted, retaining only its regular shape.

Terminal moraines on the other hand consist mainly of irregular heaps of loose earth, gravel, and rocks which the snout of an advancing glacier piles up in front of it as it pushes its way down the valley, just as a snow plough piles up loose snow. When the glacier retreats it leaves these stony mounds isolated, and even after many years they are almost as barren as they were at the beginning. In Tibet I found bushes of buckthorn growing on one such derelict moraine, and little else, though a luxuriant flora clothed the

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flanks of the valley on either side. It is only a question of time before an abandoned moraine becomes fully clothed; but it must be a long time. However, it is clear that no such structure as a moraine in the true sense of the word is possible in the rock garden, big or little; nor would there be any advantage in creating one. Any stone slope with sharp drainage may reasonably be called a scree, or even an alluvial fan; but never a moraine. And since we have the good word scree, there is no point in miscalling it a moraine. We can therefore leave the moraine and pass on to:

SCREES

There are a certain number of alpins which, though perhaps not confined to the scree, are characteristic of it.

But first let us be quite clear what is a scree and how it is formed. A scree is a rubbish tip, a steep rubble slope composed of angular rock fragments weathered from the cliffs and piled up at their foot. If the cliffs are limestone we get limestone screes; if granite, granite screes; and so on. A natural scree is the most violent thing in the alpine region. It is as dynamic as a bomb, ready to go off at a touch. In the alps it is the symbol of heat, light, and power, and of bitter cold too. Anyone who, while crossing a scree, has ever heard that ominous sound which precedes a rock bombardment, and run with leaden footsteps to crouch beneath a ledge while the stones whizz overhead, will understand what I mean.

Screes are always associated with cliffs and result from their gradual disintegration, although the cliff which gives birth to a scree may in time itself become submerged beneath the accumulating debris, leaving only the scree slope. In the Burmese alps all valleys above 10,000 feet are lined with cliffs, and the cliffs are lined with screes. Generally speaking, those on the sheltered side of the valley — that is, facing north or east — are invisible, being covered with silver fir forest and rhododendron scrub. In the drier country of

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Tibet further north, a carpet of turf starred with tiny flowers replaces scrub. On the exposed side, however, the scree is naked and hence conspicuous from a distance as semi-cone-shaped gravel chutes backed by crumbling cliffs, of which only the top 100 feet may be visible.

All this material has been broken off the cliff by the ordinary processes of weathering and has rolled down the slope; hence the fragments are angular and of all sizes from dust to boulders. The dust goes below the surface of the heap, washed there by melting snow and rain, while the coarser material stays on top. Besides this rough sorting according to size there is a second sorting, also according to size, but having exactly the opposite result, which leaves the finest material at the apex and the coarsest at the base, owing to the fact that the largest boulders roll furthest while the smallest do not roll at all. The bulk of the scree, between the layer of boulders at the base and the cone of dust at the apex, consists of medium-sized angular stones. Thus there is a crude stratification in three dimensions, which in turn stratifies the surface vegetation.

At first each scree is a distinct feature, in shape a cone flattened against a vertical wall, its axis sloping at about 50° , with a slightly convex profile. The visible base down in the valley, which consists of large lumpish rocks piled anyhow on top of each other, is of course curved; the apex which lies just under a gash in the cliff, perhaps a thousand feet above the valley floor, is composed of fine pebbles and dust.

As we ascend the valley weathering increases, partly because of the more violent extremes of climate, and partly as a result of less protection from vegetation. At the same time transport is greatly reduced owing to scarcity of water. Scree therefore tend to become confluent, beginning with their wide bases, till near the passes we find the valley flanked on either side by continuous raw scree which reach to the summit ridges, leaving only here and there a projecting rock. They are almost completely bare of vegetation.

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Although the surface of the scree is quite dry, one need only dig into it a very little way to find the finer material below moist.

From what has been said it is evident that a scree is not a feature which can be successfully copied at home. However, an artificial structure which emphasizes super-sharp drainage, which slopes towards the south, and which is watered from below instead of from above has been developed in the rock garden often, as already remarked, under the misleading name of moraine — a misnomer which would matter less if China's scree plants would be obliging enough to grow on Britain's garden 'moraines'.

On a large rock garden a scree, which should wind between two mounds and slope at not less than 20° , may, if well constructed, enable one to grow a few of the more difficult plants; not necessarily because they grow on screes in nature, but because this is the nearest we can get to the conditions which suit them best.

The soil should be excavated to a depth of at least two feet, and a foundation of corks or gravel laid down, with a filling of coarse sand. Above this will come the body of the 'scree mixture', consisting of light sandy loam, with a top dressing of granite or other chips the size of hazel nuts, the whole bed making an angle of about 20° with the level surface. Such an artificial stone bed, well drained, well watered, and well heated, though quite out of proportion, does bear some faint likeness to a scree, none whatever to a moraine.

ALLUVIAL FANS

The difference between an alluvial fan and a scree is not great, though they are formed by different means. In appearance they are alike, at least from a distance, being the same shape. Generally speaking, alluvial fans occur lower down the valley below 10,000 feet, rather than in the alpine region; but as they are bare of trees (unless these are

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planted) sub-alpine plants sometimes occupy the vacant space, and they are apt to look like alpine.

The materials of a scree, as we have seen, are broken off a cliff and slide or roll down the slope under the action of gravity. The materials of an alluvial fan are carried by water and washed out of the mouth of a gully, to be spread out fanwise as the force of the water is checked on reaching a more gentle slope.

Here the lightest material is carried furthest, and the outer edge of an alluvial fan will be composed of mud or sand, while the apex is composed of gravel and boulders — just the reverse of a scree. Also the angle of slope of an alluvial fan is generally less than that of a scree, rarely exceeding 30° . In the great river gorges of Yunnan, and also in Tibet, innumerable fans are terraced and cultivated. Indeed, they often form the only habitable land in those arid stony regions.

The above, then, are the sort of places where most of our rock garden plants grow.

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DURING our excursions into the mountains, if we climb high enough we are sure to see empty spaces, areas which are entirely bare of plants, except maybe a few crustaceous lichens brightly mottling the rocks. Sheer granite cliffs, for instance, are often as naked as on the day they were born. Boulder beds along the banks of streams, and alluvial fans along the base of a mountain are often either bare or support a few widely dispersed plants. This, however, is due rather to lack of soil and to mechanical movement than to any other causes, nor is it peculiar to the alpine region. Even in places where, taken as a whole, vegetation is abundant—for example, on a steep smooth limestone rock face in the forest—there will be many spots where no plants grow; in other words, no continuous carpet of vegetation, only scattered individual plants and clumps, with many a gap in between. There is always room in the alpine region for many more plants than actually grow there. On the other hand there are large areas, and these the more numerous, where plants grow as thickly as plants can grow anywhere, where the ground is completely hidden beneath a continuous thick-piled carpet of vegetation. And this is indeed the common condition just above the tree line, any departure from which is conspicuous enough to attract our attention and demand a reason. Such plant-carpeted areas, where particular species often form dense colonies, afford the most striking and colourful scenes in the alps. The alpine moorland covered knee-deep with dwarf rhododendron in purple and gold and lavender bloom is a never-to-be-forgotten sight in western China. Equally memorable are the shining wet valleys lined with meadow flowers, amongst which primulas by the million ripple and sway in the breeze, in Tibet.

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The alpine region, in short, is not a desert or semi-desert as is sometimes thought — far from it, though it passes upwards gradually into cold desert. This we can see for ourselves if the mountains rise into the regions of eternal snow, without further exploration; the regions above the snow line are lifeless and therefore a desert.

Let us then follow up a valley in north Burma and see the gradual transition from abundant and varied alpine vegetation just above the timber line, through regions of dwindling life, growing sparser and sparser till finally we reach the icy wilderness where no plants grow.

At the point where we pass from forest to alpine valley, climatic conditions are least favourable to tree growth and most favourable to herbaceous plants. Hence it is not surprising that the number of woody species in the forest we have just left behind is far fewer than the number of herbaceous and bushy plants which greet us immediately we reach the alpine zone. As we cross the threshold of the alps where the change over in growth form takes place, there is a sudden resurgence of life as it were. From the timber line to near the snow line, a vertical interval in the mountains of north Burma of several thousand feet, in summer at any rate the alpine zone is richly clad.

Just along the timber line patches of tall meadow plants occur, including a great variety of herbaceous perennials, especially Compositae, grasses, lilies perhaps, and primulas. Here also alluvial fans spread from deep gullies cut in the cliff, their bases covered with thorny barberry, dwarf rhododendron, bush honeysuckle and willow, sometimes also red birch scrub; while along the banks of the stream are drifts of tall flowers such as golden Trollius, like huge buttercups, table-topped Umbelliferae, and salvia. Under the bushes grow blue Meconopsis and pink-spotted Nomocharis.

Higher up the valley are screes, bare towards the top, separated by belts of green scrub. *Gaultheria thymifolia* weaves a threadbare carpet on the precipitous scree face, its stems

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beaded with inconspicuous rose-pink flowers, followed by relatively enormous pearl-white berries. Dotted about are the rosettes and mats of *Cyananthus*, and gentians, and on the rocky flanks clumps of golden-spotted saxifrage. Between the screes are boulder beds half concealed under tufts of dwarf rhododendron, with barren cliffs above. Colonies of polygonum, clumps of *Crassula*, little drifts of primulas, or *Cremanthodium*, scattered *Codonopsis*, *Fritillaria*, or cushion plants spangle the increasing desolation. Plants grow fewer, moraines, screes, cliffs grow ever larger and more naked; we are leaving the true alpine zone to enter the semi-desert where austerity reigns. Here and there a duffle-coated *Saussurea* forms a dome-shaped hump. As we ascend we find less soil and very much less humus. The summer is shorter, nature is in more aggressive mood, and so, of course, plants become fewer. The valley is like a bombed area which has not been cleaned up; all is rubble, mounds of gravel, and shattered walls.

Now there is no virtue in having bare patches in our rock garden simply because bare patches are the rule in the alps. Our object should be to model it on the lines of the most fertile part of the alpine valley rather than on the lines of the most barren. The only advantage of a bare space is to display an individual plant; and if a plant cannot hold its own in the chorus, but must needs sing a solo before it will be noticed, I suspect it is hardly worth growing. However, a little judicious bareness here and there — enough to show up a slab or a ledge of rock frilled with colour, may help, by contrast, to emphasize those parts where there is a complete cover of vegetation; although on the whole it may be said that blank spaces in the rock garden nowadays suggest lack of imagination as much as lack of vegetation. On the other hand we must not expect miracles; they are as rare as nuts in May. And it would be a miracle if the rock garden was *always* completely filled with plants. No one when starting a rock garden would be so foolish as to plant out seedlings

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almost touching one another, like mustard and cress. Perennial plants take time to grow, but in time they do grow and spread, and must obviously be given elbow room. If we were to crowd our young plants, most of them would die, the many weak smothered by the few strong. When we are planning and planting our first rock garden, it is as well to keep this firmly in mind, and to realize that for the first two or three years at any rate it is bound to include bare patches. That is where the expert gardener scores. He can see his future rock garden in his mind's eye. He knows roughly how big his plants will eventually grow, and how long they will take to reach a certain size. He aims to produce a certain effect in a certain time; a three-year plan or a five-year plan.

Again in our climate plants do not continue to grow throughout the year. They take a long rest in winter, and most of them 'die back', or even disappear completely. So after the autumn our rock garden begins to look bare, everything prepares to withdraw, and in winter, especially in the first winter, it may look almost empty, except for rows of labels stuck in the ground, giving a churchyard effect. In spring there comes a great resurrection, and ample space for expansion is absolutely necessary. Many plants rise from the dead as it were. Or seem to; for nothing of them was visible during the winter — they had gone underground. Others which had died back swell visibly, putting forth shoots and leaves. All this takes up room. So we see how necessary it is to have space to spare, thanks to summer and winter aspect. As most of us learnt at school, heat expands things, cold contracts them. Of nothing is this more true than of rock gardens; nor is it the rocks which expand under heat.

However, I repeat, we don't want great barren spaces in our rock gardens, such as we see in nature's high alpine rock garden, if only because there is little enough room to grow all we want to grow anyhow. So why waste it! We *have* to start with an open space round every plant to give it room to grow; and in winter our perennials — the rock garden, as

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we know, is not the place for annuals — will shrink and shrivel until much of the foundation is exposed. We can't help that; at least it will give us a chance to pursue some of the slugs to their lairs.

But on the whole the less rock we see the better, even if rock *is* beautiful, and no doubt the more expensive lines like Old Red Sandstone (an early vintage) and Cheddar limestone and even Yorkshire flags, are not uncomely. That is to say if they happen to be exposed, they give us no unpleasant shock, as drab or dreary materials might do — the odd bricks and clinkers and chunks of mortar of our unregenerate rockeries. But since living flowers are better than living rocks, the latter should be felt rather than seen, preferably submerged beneath a crinkly wave of blossom. Yet sometimes it is desirable to create a ledge of rock over which to drape a curtain of clematis, *Euonymus radicans*, *Parochetu communis*, or similar creeper.

No doubt to preach that the last thing we desire to see on a rock garden is rocks is vile heresy, though it is certain that plants are more valuable than the best rocks.

There is a school of landscape-garden architects who prefer rocks to plants, though I never could understand why. When they build a rock garden they are lavish with rock, but niggardly with vegetation. Accordingly we see a great deal of what is apparently desert, with rocky outcrops, relieved by a tinkling stream — the best rock garden streams always tinkle — with a few plants scattered here and there as rare as gold nuggets in the Klondyke.

Now from the box-office point of view, these gardens, which certainly deserve to be called rock gardens, none better, are an unqualified success. The eager and awe-struck crowds, attracted by the sight and sound of real water cascading over real rocks where real flowers grow, amidst the heat and dust and chatter of Chelsea's Flower Show, prove that.

Yet the designers of these real working models, which are

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too pretty, show a sad indifference to the facts of geology. *Their* water never leaves a mark. It is always tinkling coolly from slab to slab, which might be made of chromium steel for all the effects of wear and tear they show. Some of us were taught that water dropping day by day wears the hardest rocks away — but not apparently Chelsea rocks. These rocks are made of sterner stuff. They show no sign of erosion, which is, to say the least, odd in rocks of such ancient lineage. Again considering how mellow is the landscape, reluctance on the part of alpenes to grow here is ominous. But popular as this formal type of rock garden is, I suspect it is the hydraulics of the outfit rather than the flowers, which form but a negligible part, that really attracts people. What do they care about the clumps of slender *Iris sibirica* which grow by the stream, the golden buttons of ranunculus, which here and there star the turf; the clumps of primula and saxifrage which grow in lonely isolation on an outlying rock! *They* want to know how the figure works; and would be quite prepared to take it to pieces in order to find out. Movement in the rock garden, whether of water or air or animal life, is always attractive. The sparkle of dancing water, the sway and swing of flower bells in the eddying wind, makes the scene come alive. And so the crowd gapes.

Perhaps the rock garden is not quite the place for the more exuberant forms of animal life. The smaller birds are welcome to bathe in our pool; but we cannot extend the same welcome to the squirrel which scampers light-heartedly over our rarer South African bulbs, or to the hare which makes its form amongst the New Zealand alpenes, or to the loitering rabbit; still less to the predatory vole. Rodents, in fact, are tabu, but we may give a permit to the coy hedgehog, which is less porcine than he looks — or sounds. And from those slower creatures whose movements are less graceful than the movements of mammals — the ignoble army of slugs and snails which are always with us — we derive no pleasure. Nor should mice, intermediate in size though they be between the

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gnawing rabbit and the sawing slug, be encouraged. Animal life indeed, so welcome in other parts of the garden, is perhaps best banished from the rock garden — and here again we depart widely from nature. For animal life is far from inconspicuous in the alpine regions of north Burma, where the whistling marmot and the inquisitive mouse hare scamper freely.

Little by little then we perceive that the rock garden is really a very artificial construction, and not less so is the assemblage of plants we habitually associate with its rocks. Who ever saw *Rhododendron repens* creeping amongst *Calceolaria violacea* for example, in nature! So bold a flouting of geographical distribution should surely have an unnatural setting, the better to display its utter disregard of convention. The same may be said of such associations as *Pentstemon alpinus* with *Erica vagans*, wand-flowers waving over Mareposa lilies, and many more combinations. With infinite toil and sweat man has overcome space and the limited powers of dispersal possessed by plants, gathering into one spot after a hundred hard journeys the spoil which but for him must have remained for ever sundered. This is a great improvement on nature who, as regards the distribution of garden plants, has been too discreet. Necessity makes strange bed-fellows. So also do rock gardens.

The collection — any collection — of alpinines is obviously artificial, so there is no harm in putting our selection in an artificial setting. A rock garden is, as I have insisted from the beginning, a work of art, and licence as poetic as may be is permissible, in order to associate the best from all parts of the world. The result should be truly international and, of course, harmonious.

Again hundreds of plants have, through man's unconscious agency, found new homes for themselves overseas, their seeds transported hidden in the millions of tons of grain which have been moved across the world. Nevertheless there is little doubt that the majority of plants from one continent





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would never naturalize themselves in another continent, however similar the conditions. But a few individual species might. It would be interesting to know, for example, whether *Calceolaria* seed from the Andes, broadcast in the Himalayas, would anywhere germinate and the plants survive. Similarly would *Meconopsis* from the Himalayas survive in the Andes? So far as surroundings are concerned, the almost exact duplicate of their own homes could be found; but that perhaps is not enough to ensure success. Probably the experiment had better be tried first with the species of a genus common to both regions. In North America, for example, both primula and rhododendron are found, so that primulas from the Rockies and rhododendrons from the Appalachians might be exchanged for primulas from Szechwan and rhododendrons from Sikkim. Much might be learnt of the behaviour of plants from a series of experiments conducted along these lines.

Other places in the alps where there are wide gaps in the vegetation are exposed scree, sandy flats in stream beds, moraines ancient and modern, smooth rock faces, and almost any place where there is much wear and tear from avalanches, whether snow or rock.

There is no need to try and copy nature by reproducing any of these effects. A rock garden is a purely artificial construction, like a steel girder bridge, or a block of flats in reinforced concrete. It differs only in being built of raw materials, that is all—rocks, soil, and plants; sun and air and water supply the energy to make it work. Our aim is to grow as many and as good plants as possible, arranged in the best manner, without overcrowding; to avoid indecent exposure of living rock; and to achieve harmony and balance with the maximum of beauty, not forgetting that what just fills the garden in summer is bound to leave plenty of open space in winter. A rock garden is largely an expression of taste, as well as of knowledge and skill.

Absence of plant life, and indeed of animal life also, is of

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course the mark of the desert. However, we must not regard the bare patches in the alps as desert, though as these increase in size and number with increasing altitude, it is on the way to become desert. The mere absence of soil restricts the plant population. As soon as bare areas are the rule, plants the exception, we have reached desert conditions. The definition of desert is a region where life cannot maintain itself. There are few places on the earth outside the polar regions, where absolute desert reigns over any considerable area; but there is a great deal of semi-desert, near-desert, arid country, indicating degrees of dryness not amounting to complete desert. Such near-desert is due to dryness in one form or another, that is to say to lack of water. It is not necessarily due to heat — there are cold deserts like Tibet, as well as hot deserts like Libya — though Libya can be cold too on occasion, and Tibet hot. There are even wet deserts, devoid of plant life either because the water is frozen, as in the Siberian tundra, or because it is salt, and hence plants cannot absorb it. If plant life cannot avail itself of water, even when water is present, it is just the same as though it wasn't there and the region comes under the definition of desert, unable to support life.

In the mountains we notice a steady diminution of plants both in number of species and in number of individuals as we ascend towards the snow line—that is, the country gradually becomes more and more desert; cold desert. Near the snow line we find only a few plants belonging to few species widely scattered amongst a wilderness of rocks. We have reached the cold desert region beyond which is nothing but ice and snow, with occasional bits of bare rock showing through.

There is, of course, no reason why we should not grow any of these high alpine cold-desert plants on our rock garden — if we can. Many of them are strikingly handsome. They include such fine species as *Meconopsis speciosa*, *Primula macrophylla*, and *Saussurea gossypifera*, all worth growing

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but alas! all too difficult to grow. But there is no reason either why we should want to grow them in their 'natural surroundings', which would mean completely isolated from their fellows as though they were suffering from some loathsome contagious disease.

We are not likely to succeed anyhow — I mention the point because it is important to remember, when attempting to cultivate desert alpine, that they *are* desert plants, specially adapted to highly specialized conditions and hence very particular. The fact is these plants are not hardy in Britain, any more than alpine from the equatorial mountains are hardy. Thus alpine from the snow mountains of New Guinea, from Ruwenzori, from Kinabalu and similar high mountains are no more hardy in Britain than are plants from the equatorial forests. And yet they are alpine plants.

Remember also that though such plants grow in splendid isolation, that is not the secret of their success. They grow alone, not because they want to but because other plants won't grow there; they grow where nothing else will survive. Don't go out of your way to build cliffs on which no plant would nor could grow, under the impression that you are copying nature; not every aspect of nature is worth copying anyway, but it is always more satisfactory to construct a place where plants will grow than one in which they won't. Some plants would sooner die than occupy any of the vacant lots in an imperfect world.

CHAPTER XII

CRAZY

IF you visit the Chelsea Flower Show organized by the Royal Horticultural Society annually in May or June — nowadays a fashionable function of the London Season — you will notice a number of model rock gardens laid out, complete with tumbling waters. These specimen gardens not only display plants to advantage, with the avowed object of persuading you to buy them; they also display rocks, often in excess. Here the implication is more ambitious; nothing less than that you will buy, not merely rocks and plants — the mere raw materials of a rock garden, which you can assemble at leisure and according to taste — but a rock garden outright, complete with rocks, plants, *and* design. The landscapeman whose landscape garden you admire will take it down and reassemble the parts for you, incorporating any alterations you may suggest. His motto is: *you* pay the money, *we* do the rest.

You will see many different designs at Chelsea, which is patronized by the rich, the very rich, the idol rich, as well as by the idolatrous who would like to be rich, or who like to appear rich. Some of those who have lots of money but lack what money cannot buy, have a vague idea that a country 'place' would be as incomplete without a rock garden as without a W.C.; but they would no more think of constructing their own rock garden than of building their own W.C. Perhaps they are right; they know their own limitations.

To these harmless and tasteless people the landscapeman or garden architect, with the finished product, appeals; he has ready-to-wear the rock garden blithe, the rock garden austere, the rock garden precious, the rock garden ornate, to suit every taste as well as complete lack of it. The cynical may object that some of his wares are overwhelmed with vegetation, others so niggardly with it as to suggest extreme

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alpine or desert conditions, an impression almost immediately refuted by the sight of square yards of emerald green turf such as no alpine desert ever knew, and by a limpid stream from which arises no clink of icicles. Out of these pleasant lawns the bare white rocks emerge gleaming like coral islands in the Pacific Ocean.

Yes, it is possible to buy so intimate a thing as a rock garden from the shop window! It may not quite fit your 'place', yet it will look 'right' to the not too critical. The architect will install it in your new 'place', and there you are! A prefab landscape!

But a rock garden is not like a machine or a house. It is a living organism; it is born, it grows, reaches maturity, dies. But as long as it lives it continues to change. It is never quite stable, never finished. Not only can you start a rock garden on its pilgrimage of evolution — a pilgrimage that may never end in its search for the golden fleece — but you can make a rock garden different from that made by anyone else; though like everyone else you will profit by studying the designs of experts, for we all get new ideas by noticing the work of others. Nevertheless the rock garden you build with your own hands expresses *you* — and that is the theme of this book; namely to show you how you can compose a rock garden (if you ever doubted it), to guide you as to the best method (if you ever needed it), and then to leave you to it (if you ever felt inclined to try).

Not that I have anything but admiration for the man who designs, plants, and sells a rock garden complete; the last thing I want to do is to spoil the market for the landscape gardener. But the person to whom this book is addressed is not the sort of person who would be likely to buy rock gardens, and the landscape gardener may sleep easily in his bed of roses. If I poke fun at the man who does, at least there is no malice mingled with it.

So when I say design, build, plant your own rock garden I am innocent of the intent to spoil anyone's market.

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The outcrop rock garden should display a minimum of rock; but the formal two-dimensional garden can expose as much rock as you like and are likely to get. The modern tendency is towards an almost vulgar exposure of naked rock in the outcrop rock garden; and although this skeleton-impressionism of alpine plant life delights visitors to Chelsea, it can only be described as indecent. Nor must we go to the other extreme and try to crowd every plant that pleases us into a limited space. Half the art of successful rock gardening consists in selecting the right rather than the best plants and knowing what to omit.

Let us now turn to the formal garden in which much rock but few plants are involved. Almost anybody can design a garden in two dimensions, even if he finds three beyond him.

In a flat countryside a formal garden often looks better than a rock garden; in other words the small garden should conform to the lack of contours by remaining in two dimensions rather than erupt suddenly into three for no apparent reason; although as we have said, a rock outcrop *can* occur anywhere.

There are several types of formal garden, including the old-fashioned lawn, path, and flower beds, in geometrical design. Formality can even be carried a step further to embrace the symmetrical arrangement of flowers in the beds. No rocks are required in this type of garden, however, so a discussion of it has no place in a short book devoted to the small rock garden.

In the strictly formal types of rock garden, however, rocks *are* used, so we must say a few words about them, even though they are not quite rock gardens as commonly understood, and are in two dimensions instead of three.

First, there is the ordinary paved garden, whether crazy or not. The paving may cover the whole garden, or better — unless it is a very small garden indeed — only a part; the paved portion may be oblong or square; a low parapet or wall should be introduced, or there may be two walls one on

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either side, with a small pool in the centre which can be square, oblong, or circular. Symmetrical beds may be put in as required, either in the four corners or down the centre; alternatively plants may be grown less formally between the paving stones (Figs. 7, 8).

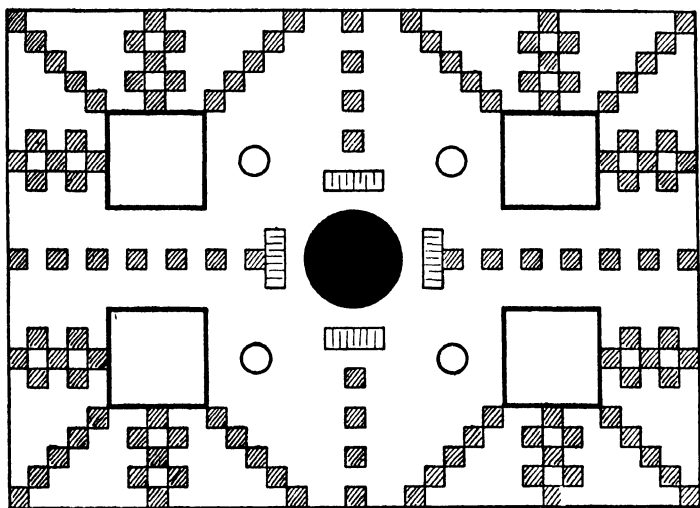


Fig. 7

Plan of paved garden 35 by 25 ft. with four square beds each 5 ft. square. A central circular pool 5 ft. in diameter, and four parapets, each 3 ft. long, 1 ft. wide at the base, and 18 in. high. The four small circles may be pot plants, shrubs or anything else

Note that it requires 118 flags each 1 ft. sq. to pave the garden as shown. The remaining portion can be paved or not; gravel, grass or cobbles can be laid down. Some plants should be grown between the paving stones and in the pool.

Secondly, there is the sunk garden which departs rather more freely from the strictly two-dimensional garden. It comprises a sunk area surrounded by low walls or banks, the excavation being one or two feet deep. In the centre of the sunk area is a pool. The main parapet will be parallel to the longer axis; at least one parapet should be curved, but if this is too difficult it may be straight. Banks may be built up with ledges for plants.

As to the kind of stone used in this formal rock gardening,

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a stratified rock such as limestone or sandstone is essential; it is impossible to construct a garden of this type with igneous (crystalline) rock, which does not cleave into flat slabs. What was said about sandstone and limestone in chapter III applies here also. Moreover, the parapets are the principal support for plants, and it is very difficult to grow anything on a granite wall. Ordinary flagstone broken up into irregularly shaped pieces makes excellent crazy pavement. The stones should be 2-3 in. thick and must be buried flush with the surface. Two types of paving are: using square or oblong flags of more or less regular size, laid close together as on an ordinary sidewalk; and using irregularly shaped pieces of various sizes, thus leaving considerable gaps between their edges — crazy pavement de luxe.

The pool may be, and will most probably have to be, made of cement. But cement should not be used for the parapets, since it is open to the same objection as crystalline rock, or flint-hard sandstone.

So much for the lay-out. Further variety may be achieved by:

1. Curved walls or stone seats — these may be of concrete.
2. The addition of a slope at the base of one of the walls.
3. The addition of ornaments such as stone troughs, a sundial, pedestals and stone lanterns, Japanese iron storks — if you like zoo-effects without the noises — fountains and so on, according to taste and resources; there is no end to the bric-à-brac it is possible to include.

Not that I recommend you to introduce extraneous objects into your rock garden in the mistaken belief that it will thereby be changed into something else. One cold iron stork no more makes a Japanese garden than one swallow makes an English summer.

The perky outcrop bristling with needle-shaped rocks like a peevish sea urchin is as heinous as the dreary smut-smeared rockery of our great grandmothers with their sad cold clinkers from which all the light and life and laughter had

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gone out with the gas. Such effects are incongruous, and incongruity is an odious vice in art.

In the examples given it is obviously the rock which is important; plants have been relegated to the background, though, as we shall soon see, not abolished altogether. However, at the Chelsea Flower Show, one sees real rock gardens stiff with rocks naked and unashamed, where plants are a bad second. What is merely eccentric in the three-dimensional rock garden is characteristic of the two-dimensional paved garden.

THE PAVED GARDEN

The following instructions are merely a guide. Make a terrace say 20 by 40 ft. and pave it with ordinary flagstones or, if these are not available, with cement blocks; these should be approximately the same size, since we are now aiming at extreme formality, and not more than 18 in. square, or 18 by 24 in. Two paths at right angles, each $2\frac{1}{2}$ ft. wide, bisect the terrace; where they cross in the centre a space is left for a small pool, square or better still circular, 2 ft. in diameter and $1\frac{1}{2}$ ft. deep. This must be lined with cement (Fig. 8).

The paving stones must not touch one another, and plenty of room should be left for plants to grow between them. It remains only to select the plants, remembering that the choice is limited; and that only light soil should be left between the stones in which to plant them — you don't want an imitation of the magic beanstalk growing up story by story in your garden.

That is perhaps as simple a design as can be imagined, and given the stone it is easy to construct. The difficulty for many people will be to get the stone; that is why I have suggested flags — but don't purloin them from the Rural Board or the Local Council just because you may find them difficult to get; the Authority might retaliate. As for cement, you may be driven to use it in the last resort — but make certain it is

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the last resort before you commit yourself. Soft sandstone, limestone, and mudstone, though liable to crumble, are all to be preferred to cement; even shale or lava is good if it is the right shape — and there's the rub. Flagstones — which, by

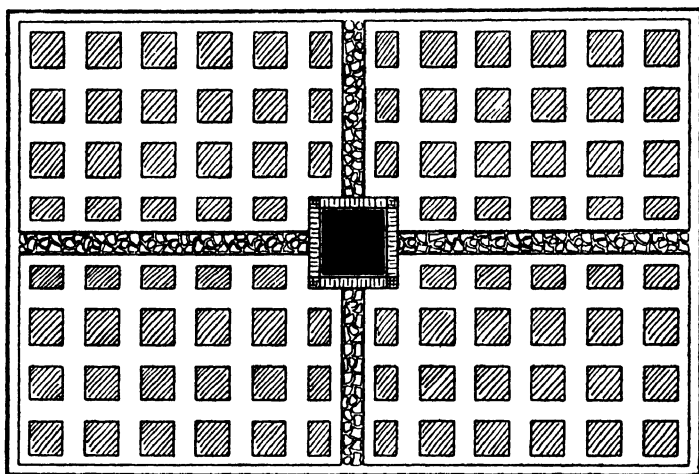


Fig. 8

Plan of a paved garden, 60 by 40 ft., with a central pool 6 ft. sq., 18 in. deep, surrounded by a parapet 1 ft. thick, 18 in. high

Four paths, 2 ft. wide and crazy paved, meet at the pool. The large flags are 3 ft. square, the smaller 3 by 2 ft.

Any of the plants mentioned on p. 144 may be grown in the 2 ft. wide spaces between the flags. Plants will also be grown on the wall, and aquatic plants in the pond.

the way, are generally made of hard sandstones, such as mill-stone grit — are already cut to the required shape; anything so esoteric as lava you have to get cut to order, unless you live in Tengyueh in Yunnan where the roads are paved — when they are paved at all — with blocks of lava from the local (extinct) volcano.

One other point: the bedding of whatever stratified rock you use should be parallel to the surface, that is to say horizontal — not tilted; although if the stone has been squared up, this is not a matter of great importance. It will probably be found, however, that if the strata dip, even though the

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flags are laid level, the surface of your terrace will become irregular and unpleasant to walk on.

The above outline for a paved garden is merely an example of what can be done. No principle is involved except the principle of a two-dimensional flat garden. The design can be altered at will.

The second type of paved garden is more elaborate, and requires more material. Although the relief is so low that the garden as a whole appears flat, there is an approach to a third dimension. Also the plan allows for a rather bigger garden than the one just described, say 40 by 60 ft. The sunk portion should be excavated to a depth of $1\frac{1}{2}$ or 2 ft. with a single fair-sized pool, or two smaller pools, each of which must be further excavated to a depth of 18 in. In a garden 60 by 40 ft. the outside measurement of the sunk portion would need to be 40 by 20 ft. and the pool might be 10 by 10 ft., or there might be two pools, each 5 by 5 ft., with a broad flagged margin. Near the pool one or two flags may be missing to leave room for clumps of 'Sibirica' iris or of *Primula Florindae*; but it must be distinctly understood that these will make a show for only a very small part of the year. However, we will deal with plants later.

The outside paving, unlike that of the paved garden just described, may be as crazy as you like, but the stones must be large enough to stay put. They must not become dislodged just because you are unlucky or careless enough to kick a raised edge; you may dislodge yourself, but not the stones. To achieve this stability the stones must be of a fair size and weight and must have a large area of contact with the earth beneath, to prevent horizontal motion. Pavement which sinks and rises like the waves of the sea is both troublesome and dangerous. It suggests earth tremors; the plants don't like it.

And now for the plants which are to be grown between the slabs, as it were the mortar which binds them together. They must be the kind you can wipe your boots on. Of course you

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need not actually wipe your boots on them to see if they qualify, but you should be able to do so if it were absolutely necessary. It is inevitable that they will be trampled underfoot, but more by accident than in contempt. Visitors, no doubt, will step gingerly over them, hopping from step to step rather than crush them — or trip over them and not be asked to tea again; but you can afford to be more callous.

To qualify for the paved garden plants should not exceed a few inches in height, six inches being the maximum; the majority will be no more than an inch or two. Here and there in the sunk garden, and of course on the parapets, an exception may be made, a suitable plant towering to a height of ten inches or a foot — it may be a clump of snapdragons or a wallflower; while a clump of 'Sibirica' iris will be taller still. But the plants designed by nature especially for this type of garden are the creepy-crawly fellows, the mats, the cushionettes — plants which have length and breadth but no thickness. There are many plants of this kind amongst the saxifrages and stonecrops, the Cruciferae, campanulas, primulas, and other groups, not all of them fool proof. Many plants already mentioned as suitable for the rock garden are specially suitable for the paved garden, and all plants suited to the paved garden may be grown on the outcrop rock garden. Of plants which do not form either mats or carpets and which neither creep nor crawl, some of the sedums (house leeks), dwarf iris, grape hyacinth, anemone, and others are admirable.

Plants with aromatic foliage are especially welcome, but there are not a great many of these to choose from. Make the most of the thymes. There is always more rock than vegetation in a paved garden, and, the stones being well heated by the sun, the plants enjoy conditions palely like those found in the Mediterranean region; or, for the matter of that, the conditions of the South Downs, with their carpet of crisp turf and wild thyme, are repeated. In a semi-arid climate such as

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the Mediterranean coast enjoys (or suffers), aromatic plants are numerous, and it is surprising how many of them take kindly to our English drizzle; the key to the Mediterranean climate is the hot rainless summer, and nobody could honestly say that the English summer is always rainless — or even hot. The best known of these is lavender, which does well at least in the south of England. The paved garden with its hot slabs and heat-reflecting walls is the best we can do for this kind of plant.

Under such conditions aromatic plants give of their best. The formal paved garden is the scented garden. Colour, not flamboyant but in pastel shades; fragrance, aromatic or sweet; and above all a grace of form and line very miniature, are the qualities required in the paved garden.

In some ways it is easier to make a pleasant paved garden than a successful outcrop garden. For one thing you are not worried by the relationship in size between rocks and plants. Never need you feel even remotely that the paved garden ought to represent mountain scenery, and try to resolve the insoluble problem about model size rocks and life-size plants. So long as you remember that you want to walk safely in the fragrant garden by starlight, (without falling into the pool), you are not likely to err in the type and size of plant best suited to it. Moreover, the limited depth of soil will not support unruly vegetables. It is true that in Burma seedling trees take root between the sun-dried bricks of ancient pagodas and, growing swiftly, disrupt the building, heaving up the paving stones and hurling down the masonry. But such things do not happen in our less violent climate where everything grows more leisurely. As in the outcrop garden, the soil in the paved garden, what there is of it, must be light and on the poor side. Clay is useless and in fact harmful; the hungriest gravel would be better than clay. Good drainage is as important as in the outcrop garden. Where the spaces between the stones are inches wide the soil must be firmly rammed, and of course it should extend beneath the

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stones as well as between them. To ensure this, before you lay the stones in place, prepare a foundation of light sandy soil mixed with a little leaf mould to bed them down in. The spaces between the stones must then be filled in with the soil, and rammed home. Plants can now spread their roots under the stones — they are not strong enough to uplift them appreciably; at any rate not for a long time.

For the cracks and crannies of the crazy and not so crazy pavement any of the following will pay a good dividend: *Draba Aizoon*; *D. Dedeana*; *D. bruniona*; *D. sibirica*; *D. bryoides* var. *imbricata*. All have flowers of some shade of yellow, except *D. Dedeana*, which has white flowers.

Arenaria purpurascens; *A. montana*; *A. caespitosa* — the first-named has purple, the other two white flowers.

Anemone Pulsatilla, our native Pasque flower, with several cultivated colour varieties from violet to mauve and from purple to red.

Armeria caespitosa; *Scutellaria indica* var. *japonica* — most of the scutellarias commonly met with are too tall for the pavement; *Phlox Douglasii*.

All the above-mentioned — and the resourceful gardener will think of many more possibles — are small, compact, trim little plants with bright cheerful flowers well displayed amongst the taut and tufted leaves. You can tread them underfoot and they will turn the other cheek. Take your choice, or give them all a trial and cherish those that come through best. Only *Arenaria caespitosa* is aromatic. Fill in gaps with such as *Sedum hispanicum minus* or *Raoulia glabra*, or with arenarias, saponarias, acaenas, campanulas (of course)!

On any parapets and ornamental walls you care to build — and these must be somewhat loosely constructed, leaving spaces between the rough-surfaced stones into which plants may thrust their roots — taller plants should be grown. Even dwarf shrubs of trailing or flatly spreading habit are admissible; and these should be encouraged to hang over the edge in negligent tapestry. Vermilion berried cotton-

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easter, and blue berried honeysuckle (not the twining kind) are both good. Clematis and some roses may be encouraged to sprawl here and there. These, however, won't grow on indomitable cement, and suitable provision must be made for them. Aubrietias look particularly at home on walls. So also alyssums, many campanulas, cotyledons, Dryas, Hypericum and the blue flowered *Dracocephalum Hemsleyanum*.

Other herbaceous perennials for wall crevices will be found amongst the sedums — try *Sedum ternatum*, *S. spathulifolium*, *S. spectabile*, for a start, but there are many more — and amongst their nearest and dearest allies the sempervivums (*Sempervivum arachnoideum* is my own first choice); there are also *S. tectorum*, *S. Schlehanii*, *S.*——; but look them up in any nursery catalogue and take your pick, avoiding only those which 'do best in the alpine house' and those which die after flowering, whether annual or biennial.

The saxifrages provide a host of starry-flowered wall plants with white, yellow, purple, or spotted flowers. There are many hundreds from which to choose, and it would be invidious in a book such as this to recommend one or two from so great a number. My advice as regards saxifrages is: consult Farrer's *English Rock Garden* or other comprehensive work, and select a score of names whose descriptions appeal to you. Next turn them up in the catalogues of two or three nursery firms which specialize in alpiners and rock plants and see which are available and what they cost, and also what the nurserymen have to say about them. Nurserymen may be more enthusiastic than Farrer — their job is to sell plants, — but they are not likely to be so picturesque. By now your score may be reduced to a round dozen. Finally, go and see the plants themselves, either at a flower show or in a botanic or private garden. After all that hard work you may find yourself left with a couple of saxifrages you really hanker after; so why not persuade a gardening friend to give them to you!

Other pavement plants of which there is no lack to-day,

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save of the aromatic kind, may be selected from the following:

Antennaria. Tufted woolly alpine perennials, including cushion plants from the highest altitudes; dioecious — i.e. sexes separate, stamens in one flower, pistil in another, otherwise indistinguishable from *Anaphalis*, a genus of many species, few if any of which are in cultivation; and barely from *Leontopodium* which includes the well-known edelweiss.

Antennaria dioica rosea is a good choice, also *A. d. tomentosa* which has cream flowers. Both about 6 in.

Dracocephalum Hemsleyanum. An easy Tibetan, which grows fast.

Dianthus deltoides. Flowers pink. 6 in.

Helianthemum alpestre forms prostrate mats (just the thing for the paved garden) which are starred with yellow flowers in the summer. Modern varieties of *H. vulgare*, 4-6 in., such as 'Apricot', 'Sulphurum' and 'Ben Heckla' (red) are also good. Beware double flowered varieties; which have no more business here than in the outcrop garden.

Hypericum reptans. Forms ample mats sprinkled with golden yellow flowers. The leaves turn claret red in autumn.

Linaria alpina. In summer the prostrate stems heave themselves up in short sprays of wee violet flowers, each with a glowing orange eye spot. You hardly dare tread on them, so dainty are they.

Mazus reptans is a plant which, abundant and common though it is, you might easily overlook in the immensity of the Himalayas, surrounded by more gaudy plants. Nevertheless its little discontented-looking pouting mouths, like blindly opening lilac beaks of dumb fledglings, have an irresistible charm and the plant is perfectly suited to the paved garden.

Silene alpestris. White flowers on 6-in. branching stems sprouting from leafy green tussocks.



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Veronica Teucrium dubia. (*V. rupestris.*) Stems prostrate, flowers celestial blue.

The entire available space will not, of course, be filled in with plants milling for dear life. The aim here is to suggest heat, light, freedom, airiness, sunshine beneath blue skies. Such a demi-paradise is apt to be chary of vegetation, as though suspicious of its own attractions; not perhaps without reason.

As for any walls and parapets, they should be built of sandstone or limestone blocks without mortar in between, and must be slightly tapered from the base up to give them stability. If they are, say, 1 ft. wide at the base, as in Fig. 5, they can be tapered by means of setbacks to 6 in. at the top; and since the wall is 18 in. high this can be achieved by means of three ledges of 2 in. (1 in. on either side). Between each layer of stones is a layer of light loam instead of mortar, several inches thick; otherwise the stones are laid like the bricks in a wall. Plants must be firmly rammed in while small, between the stones and along the ledges, and left to settle down. Larger plants, up to 6-9 in. or even a foot, can be used than for the pavement, and prostrate dwarf shrubs which will dip their branches over the sides can be planted on top. The wall may be more crowded than the pavement, but must not be congested either. You don't want it to look like the chawls of the Bombay mill area. I have already suggested several suitable wall plants. Excellent choices are also to be found amongst the alyssums, arenarias, aubrietias, cotyledons, dianthus, erodiums, gypsophilas, polygonums, potentillas, and many more. Even some of the august primulas look fine perched upon the wall; but then this ubiquitous genus of a thousand children has plants for everywhere. But as I have said, the determined rock gardener will not need to be given a select list of who's who and what's what for any purpose; given a lead he will experiment for himself.

CHAPTER XIII

NEW AND RARE

A ROCK plant need not take up much space, a few square inches or a few square feet perhaps; or, including the rock, a cube of no great size.

A solitary mountain top or an outstanding peak, in a world bristling with peaks, is only a point on the map; though a mountain in a range of mountains such as the Himalayas may easily cover several square miles — just how many depends upon what we regard as part of the mountain. Of course its roots are tangled with those of its immediate neighbours, therefore in order to define the particular mountain we must either describe a circle of arbitrary radius round its summit, or select an arbitrary contour and say, above this contour is the mountain.

The type of flora (that is to say the families and genera of associated plants) and the type of vegetation (whether forest, scrub, grass, alpine, and so on) of almost any region in the world is known to botanists with fair accuracy, no matter how unexplored the region itself may be. Even in New Guinea, in Venezuela, in Tibet, where vast areas are unexplored, a botanist would have no difficulty in giving a summary of the plant life to be expected for the benefit of any explorer who was visiting the area. So much is known already of the plant life of the world that a prospectus of what is not known for certain would not be difficult.

But the question no botanist can answer — and for the horticulturist it is important — is: how many new plants of horticultural worth — varieties, species, even genera — are there? And until every mountain top has been explored intensively it is impossible to say that nothing has been overlooked; for, as remarked above, a rock plant, and especially an alpine rock plant, takes up very little room and may easily

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be missed, even by a botanist, when not in flower. It is certain therefore that many, probably hundreds, of good garden plants have still to be discovered. When I discovered *Lilium Wardii* in Tibet, a good many years ago now, experts were saying that it was very unlikely any more lilies would ever be discovered; the world was too well known for that! Perhaps only those who have travelled far from the haunts of men realize how imperfectly the world really is explored! A recent experience of mine throws further light on this matter.

One would imagine that the flora of Manipur — a semi-independent native state between Assam and Burma which became famous during the war, but had been known for half a century for its orchids — held no secrets for the horticulturist. Yet when in January 1946, while searching for a lost American aircraft, I climbed to the top of a small mountain only 45 miles from the capital, and only 8450 feet high, I found there two species of iris, a *Nomocharis* (a beautiful lily-like plant) and a rhododendron, all unknown in gardens, even in Manipur!—but no aircraft. This was not because the mountain had never before been climbed, but simply because it had never been climbed by anyone who could recognize these plants in their naked winter garb. Nor had anyone climbed it when they were in flower. There are hundreds of mountains like that in the world.

What we know is, that in the alpine regions of south-east Asia will be found species of rhododendron, primula, cotoneaster, *Meconopsis*, *Cyanthus*, lily and many other, none of which genera are found, for example, in the Andes; whereas in the Andes occur such genera as *Calceolaria*, *Embothrium*, *Fuchsia*, *Lapageria* and *Tropaeolum*, none of which are found in Asia or any other part of the Old World. But what *species* of these genera are still to be discovered we can only guess. Although many genera, like those just mentioned, are peculiar to the Old and New World respectively, there are also many genera common to both. Undoubtedly,

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it is in the mountains that the majority of new species are still hidden away. The supreme fascination of the rock garden lies in the fact that it is an association of plants from every quarter of the globe, including tropical mountains; for the climate on the top of a high equatorial mountain is not 'tropical' in the popular sense of the word. It is useful to be able to compare living plants from the Andes with their opposite numbers from the Himalayas, plants from the New Zealand alps with plants from the Japanese alps, or from the Tien Shan, or the Atlas — or from anywhere with anywhere. Considering the extremely diverse conditions under which they live in nature, it is amazing how so many of them settle down comfortably in a country foreign to them all. Of course some don't. They die young, often before they reach flowering age, and we not seldom attribute this to the shortcomings of the English climate, which is certainly not perfect. Yet it cannot be altogether bad when so many plants find it congenial. As a matter of fact it is often more regular in its vagaries than many a monsoon climate.

But after all, what do we know of the conditions under which a plant from 12,000 feet altitude in the Himalayas really lives? We can no doubt say that the annual rainfall is 70 inches, that the plant is under snow for six months, and that it grows on limestone cliffs. But all that is crude generalization. It tells us nothing about atmospheric humidity, though that is very important, or about bacteria in the soil, which is still more so; nothing about light intensity, air conditioning, water content of the soil, temperature gradients, and many other things we would like to know — though we might not know quite what to do with the information if we had it. With the information at our disposal, it is rather surprising that we manage to keep any of these plants alive. The conditions they accept at our hands, perhaps, do not even remotely resemble natural conditions. The answer is, I suppose, that many of these conditions are unimportant.

The up-to-date nurseryman who deals in rock plants

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issues a catalogue in which there will perhaps be a section devoted to 'new and rare plants'. Generally speaking the 'new' are not more than 15 or 20 years old; while we are left to guess where the 'rare' are rare — whether in England or in Darkest Africa.

Obviously both 'new' and 'rare' are comparative terms, and it may be instructive to inquire what the plantsman means by them.

'New', as applied to a plant, may mean any of the following:

(1) Botanically new. The plant has very recently been discovered by Western botanists — the actual finder may or may not have been aware that it was 'new'. Anyhow, it was. Hitherto botanists did not know of the plant's existence, hence it has no outlandish Latin name. For the same reason, no specimens of it exist in any Western museum. Asiatic traders or pilgrims travelling slowly over immemorial passes may have trodden it underfoot every summer for generations untold; but it is new to men of science, to botany, and to horticulture.

(2) New to cultivation. To the gardening public these plants are as new as the botanically new species. They were however, known to science, having been discovered, collected, described, and the description published in a recognized journal, and in recognizable form. The species has been assigned to a genus, known or unknown, the genus to a family. The mummy has been safely laid in a paper sarcophagus, and henceforth and for evermore is the 'type' of that species; that is to say the original specimen which was described. Had it not been collected it could not have been described and named, since a scientific name, to be valid, must be attached to an actual specimen. But the specimen may be no more than a mummy, and nobody but the original finder need ever have seen the plant alive. Consequently, if someone presently decides that the plant would adorn the rock garden, and 'introduces' it to cultivation by collecting

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seed himself, or by persuading someone else to do so, or by any other means, it is much the same as introducing a new species; it is new so far as horticulture is concerned.

It will perhaps be news to many that *Meconopsis betonici-folia* had been known to science for nearly half a century (and forgotten for half a century) before I introduced it from seed which I collected in Tibet in 1924. The 'type' reposed, a mummy, in the Paris Museum; it had been discovered by Père Delavay in Yunnan (China).

(3) Finally, there are those plants which have at one time or another been in cultivation but have since been lost. (Undoubtedly many plants were lost during the war for lack of attention.) These are not new in either of the senses mentioned above, and yet they are new to a generation of gardeners who have never seen them. This process is continually going on owing to mass fatalities which occur in our gardens in years of unusual cold — or heat — or drought — or deluge. Almost as fatal to many plants as the neglect of the war years were the wet summer of 1912, the drought of 1921, the glacial cold of 1939, and similar afflictions, including winter heat waves and summer frosts. How many fatalities occurred in the winter of 1946-47 is not yet known.

The nurseryman, however, usually means by the term 'rare' any popular plant introduced within the last ten or fifteen years, and hence well established; if it is not popular, it is unlikely to be well established, and so may be called rare, and unless it is well established it is unlikely to be in the hands of the trade generally.

About this word 'rare', a plant may be rare, or very rare, in cultivation, but extremely common on its home ground. Many rare plants are cultivated by connoisseurs in England whose names will not be found in any nurseryman's catalogue, because they are not on the market, and could not be sold if they were. Farrer in *The English Rock Garden* described a number of plants which were not then in cultivation, but might become so; some of them *have* since become

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so. On the other hand, a plant may be in varying degrees rare or local in the wild state, but common in cultivation. The beautiful tropical tree *Amherstia nobilis* is a good example. It was discovered in a single locality in Tenasserim and has never been found outside that locality; there are said to have been few specimens even. To-day thousands of this handsome ornamental tree are growing throughout the eastern tropics, wherever suitable conditions occur. Just how rare a species could be is uncertain, but theoretically there might be only one of it in existence. On the Tibetan plateau I once found a delightful rock plant in flower at 14,000 feet altitude. There were about a dozen plants in all, on a bare gravel cliff. After climbing the cliff with my camera on my back I spent some little time taking a photograph of the finest specimen; this completed, I descended the cliff, having quite forgotten to collect a specimen of the strange plant! However I was not going to climb the cliff a second time, especially as it seemed certain I should meet with the plant again in a more accessible spot. But strange to relate, I met with no further specimens, nor have I ever seen it again to this day, and those dozen plants occupying a few square yards in all the immensity of Tibet may, for all I know, be the only specimens in existence!

More curious still is the story, with a happier ending, of the golden *Leycesteria* (*L. crocothyrsos*). I came upon a solitary specimen of this remarkable shrub in the rain forest of the Mishmi hills, quite by chance; I certainly should not have noticed it if it had not been in full bloom, as it was some distance from the path. Five months later I returned to the spot and collected seed from the same bush; for I found no more, at this or at any other time. It so happened that five years later, being again in the Mishmi hills, coming down from Tibet, I went out of my way to visit the plant, growing in the gorge of the Delei river. Alas, it was nowhere to be found — it had been cut down! So far as I knew, there was not another specimen in the world; a unique and beautiful shrub

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had been exterminated. But wait! Meanwhile scores of plants had been raised from the seed I had sent to England. If then it is extinct in Asia, it is very much alive in England to-day!

To the nurseryman, of course, 'rare' always means rare in cultivation; he is not concerned with its botanical status. However, plants offered under this attractive title are seldom as rare as he would have you believe — otherwise they could scarcely be on the market. No nursery firm nowadays has a monopoly of the new or rare plant, unless of course it is something the nurseryman has raised himself — and then his monopoly is short-lived. Rivals are not always over-scrupulous in the means they employ to get just one plant — nay one cutting, one bud, of a popular novelty.

Many beautiful rock garden plants are known to botanists, and to horticulturists too, which are not in cultivation. In describing a few of these I am conscious of overstepping the bounds I laid down for myself, namely to write a book suitable for beginners. But it may be that this book will fall into the hands of a few enthusiasts who want to take up the study of horticulture as a life study; and it is to them the story of lost and rare plants may appeal. I must point out, however, that the reason some of these plants are not in cultivation is not because they are difficult — many gardeners are anxious to try their skill on them — but simply because they are unobtainable in any shape or form. There is the airy-fairy *Campanula calciphila* for example. It has been in cultivation at least once, from seed I collected in western China, and even went so far as to flower. To-day there is not a plant nearer home than the white limestone crags of Yunnan, 14,000 feet above sea level. It is a dainty gem, its most striking feature being the rounded, almost kidney-shaped leaves with emerald veins inlaid on a dark malachite background, and delicate pale violet flowers hovering over them like little chalk-blue butterflies. The maroon meadow primula of the wet Mishmi hills did not get so far; for

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although the seeds germinated and produced small plants, not one of them flowered before passing away. This *Primula rubra*, as I named it, is like a dwarf *P. sikkimensis* with claret-red flowers, and small rounded leaves. It may be locally common but is not widespread, and I met with it only once on the Assam frontier near the snow line. When I think of the long bitter struggle I had to secure seed of this charming primula with the modestly dancing red bells, it makes me feel sad that it is lost. *Meconopsis speciosa* is widespread, and hence not particularly rare, though too widely scattered to be really abundant. It is one of the prickly poppies, with sky-blue flowers which have a sheen like shot silk. These delicious flowers are fragrant, a totally unexpected virtue. Plants have been raised in England, but they never survived the first winter, and someone will have to go to the alps of Yunnan or to Tibet to get more seed for another try.

The incandescent blue *Veronica lanuginosa* is perhaps very rare. I have seen it but once, and worshipped it as though it were a China blue goddess. It never grows below 16,000 feet and is sure to be delicate; but so far as I know seed of it has never reached England. Not hard to see in flower on the gaunt Himalayan scree, it is almost invisible by October.

The incomparable rock plant which used to be called *Myosotis Hookeri* (now *Chionocharis Hookeri*) is another of those elusive jewels which has opened a solitary flower to show us its quality, and then departed for ever. Even one flower was better than nothing — but not much better. How different it looked from the massive cushions, illuminated with a hundred twinkling kingfisher-blue stars which bulged fatly amongst the naked grey rocks of Tibet.

Many Asiatic primulas, that race of aristocrats, have flowered and passed away like a vision — *Primula eucyclia*, *P. Baileyana*, *P. Wattii*, to mention but three. Others have been seen in the far hills, but not brought back. If we include all the lost, and unknown, plants of the Andes, the Tien Shan, the New Zealand alps, and all the mountains of the

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world there would be no end to the number. Our plant hunters can take heart; their task is not done yet. Nay, it has scarce begun.

Within the next fifty years our rock gardens may be revolutionized again. We shall have newer, bigger, and brighter plants, both species and hybrids to choose from; and there will be more Everyman's plants of the kind you have only to ram in the earth and they will grow — so long as you don't ram them in upside down. I sincerely hope, however, that we shall not waste our talents trying to produce a blue rose which isn't blue, or a double sweet pea which is double Dutch, and so no longer a pea, however sweet.

One may also hope that the thrill of novelty will not make us neglectful towards the many good plants which have served us faithfully for so long, and that the best of them will survive. We need not keep them for false sentimental reasons, but because they are good value.

Remember that really difficult plants are not sold in sixpenny packets with lurid pictures on the cover. They are not displayed in flower shops, or at Chelsea. They are not even mentioned in nursery catalogues, however expensively got up; and you may search for them in vain in almost any gardening book. Until they are in the trade they are boycotted or, more probably, shrouded in a mysterious silence. But if by chance you are a student who really does want to know about these hush-hush names and what they stand for there is still one way by which you may profitably pursue your researches. Solms-Laubachia for example. (Golly, what a name!) You have heard mention of such a plant? or *was* it a plant? How to find out? The ordinary sources of information are silent. What is it like? Where does it grow? These and other questions haunt and worry the seeker after truth. It is no use looking it up in the *Encyclopaedia Britannica*, in *Who's Who*, or *The Oxford English Dictionary* — those three flowing wells of knowledge available to the modern Englishman.

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Nevertheless, there is a sort of botanical *Who's Who* which is the fountain-head of knowledge for all plant names. It is called the *Index Kewensis* or in pronounceable language, Kew Index.

Now the Kew Index is a large book in many volumes, which is inevitable for an up-to-date encyclopaedia containing half a million entries, however brief. Your bookseller will not have a copy which you can furtively consult while waiting for your change; nor will there be a copy in your public library. You can, however, consult a copy at the Royal Horticultural Society's library, at the British Museum Reading Room, at Kew, or no doubt at any other of our seats of learning.

What unique information, then, does the Kew Index give?

It tells you two things about a plant's name, both vital.

(1) Whether the name is genuine, that is, attached to a real plant, or merely mythical, attached to an imaginary or previously named or non-existent plant.

(2) Where to find the first description of the plant — if real.

Now you have that priceless thing so laboriously sought, so callowly missed by the modern crime sleuth — a clue.

The rest is up to you.

NEVER SAY DIE!

Most garden plants, like most men, die in their beds.

But it is easier to kill a man than a plant. Short of digging it up and casting it on the rubbish heap to enjoy a lingering death, you may bash a plant about, cut it up, ill-treat, wound or torture it in a dozen refined and ingenious ways and it will recover and continue to live happily ever after. It may even multiply as a result of dismemberment.

The plant's motto is: 'Never say die!' Nevertheless, they do.

But plants are tough. Perhaps they need to be, for the competition is generally severe and always unrelenting.

Though no plant has so much life concentrated in one spot as brain or heart, injury to which results in quick death — though life is more evenly diffused over the structure — a tree is not alive all over. Much of it is mere pipe-line, or mechanical support—that is skeleton. The life of a big tree is confined to the ends of the branches, and to a thin cylinder of wood beneath the bark. If the tree is 'ringed' by making a shallow circular incision all round the trunk, it dies slowly of thirst. On the other hand, many a hollow tree lives for years. Ringing is in fact the simplest way to kill a tree, though it is not quick: just as the easiest way to kill an herbaceous plant is to dig it up and throw it aside. But leaving out of account such drastic means as the cutting off of the water supply, it is not always so easy to kill a plant.

How many plants, particularly how many rock plants, die of old age? Not very many, I am afraid. Annuals and biennials die at the end of their allotted span, which rarely exceeds eighteen months. Our herbaceous perennials, a word which covers a life of from two or three, to ten, twenty or more years, die of a multitude of ills before their time.

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Very rarely do they reach the age-limit and retire. Of course if we 'divide' them we confer a sort of immortality on them.

In plants, life is not centred in a few one-and-indivisible organs, which are as it were the hub of existence. There are always spare parts. Life is spread evenly, and when the plant is dismembered equal measures of vitality go into equal sized pieces. Not all plants can be increased by division, but many can. Only the simplest animals can do this — indeed with the most primitive forms of animal life it is the normal method of reproduction. Higher up the animal scale of life this increase by geometrical progression is soon lost.

In nature plants rarely increase themselves by violent division. But there are forms of gentle division, such as runners and offsets, bulbils and suckers, which are commonly practised. However, not all plants can produce offsets, nor in the vegetable kingdom is a sucker born every minute. Flowering plants at least normally prefer to reproduce themselves sexually by means of seeds.

The killing agencies in nature are no doubt many, but we are not concerned with them. What we are concerned with is why plants die in the garden. And the first thing we have to note with regard to the rock garden is that few of our rock plants are really and truly at home there. As soon as we fully realize this we shall begin to understand why losses are apt to be heavier in the rock garden than elsewhere after a wicked winter. One must remember too that death in the ranks of the rock garden leaves noticeable gaps, which often look more serious than they really are.

It was for this reason that we advised the beginner to start with plants of proved easy culture, the diehards of the plant world. If British plants, those of the bulldog breed, cannot always stand the British climate, it is unlikely that foreigners can.

In the rock garden the damage done by any particular disaster is usually visible immediately, on the surface. Apart

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from mysterious deaths, which are not common, we can tell at once what has happened — we know which plants were killed by frost, which by drought, which by drowning and so forth. Probably more rock garden plants are killed by the vagaries of the British climate directly or indirectly than by any other means. But that is not to exonerate the grower entirely.

It is just here that misunderstanding has been caused by the confusion of rock plant with alpine. We grow in the rock garden a far larger assortment of plants than in any other part of the garden of equal size, from those which in their native haunts habitually spend half their lives under the snow to those which have never seen any snow in their lives. They have little or nothing in common except that the majority are short-lived perennials, which would not normally last ten years. Neither do they with us. Whether or not they last five depends a good deal upon whether they are or are not alpine, and upon the convulsions of climate.

For example, there is a class of Asiatic primulas (*Nivales*) that wear collars. If they get water down their necks, a thing which can only happen in winter, when the plant ought to be asleep, or resting, as in its native land, it stays there, and the collar rots. This is disastrous, because presently the whole plant rots. Actually it is fungus which causes the rot to set in; and it quickly spreads. But the fungus would never have gained entrance but for the damp conditions, due to the milksop British winter. In the mountains of Asia, where these primulas grow, such a thing could rarely happen, for they are buried under several feet of snow for at least five months. When the snow melts summer is here, the primulas are growing up quickly, shooting their necks out of their collars, and are quite safe. Whether the fungus which slays them in Britain is present at all in their own hills is not known. If it isn't, others equally wicked are sure to be.

This is merely one example out of many. Plants which are habitually exposed to rain only when the soil is warm,

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the air balmy, and the sun shining (perhaps), unaccountably find themselves exposed to rain when the soil is cold, the air raw, and the sun invisible. The reason why they experience none of these discomforts in their own country is because from December to April or May they lie snug under a blanket of snow. With all our skill as gardeners this is something we cannot provide, and no efficient substitute has been found, though there are one or two efficient palliatives, which can be used to a limited extent — cloches and the like.

Growing side by side with these alpiners which spend the winter snug and warm beneath a snow quilt, reduced of course to hardly more than a collar on top of a root, (as *Primula Agleniana*), or to a tight yellowish bud like a pointed Brussels sprout, (as *Primula sonchifolia*), or to some similarly protected growing point, are plants like thyme, or seapink, or veronica, which have rarely seen snow, and wand-flowers (*Diarama*) from South Africa which never have.

So whether there is snow or not, some of our rock plants are going to get the shock of their lives.

But though our mild damp winters account for many casualties in the rock garden, they are not the worst killers. It is the climatic inversion which occurs from time to time that is really murderous.

Owing to our medieval custom of reckoning the seasons from the equinox — spring beginning March 21st according to the almanac, instead of (as it does in fact begin), on March 1st, this inversion, when it occurs, does not look so bad as it really is. January and even February may be mild and sunny, a cold 'snap' coming perhaps in March or April. No great harm results, because however mild the winter, few plants will be fooled by it to that extent. It is when spring is mild, followed by wintry weather in early summer, (that is, late spring according to our lying almanac), that disaster results. Once plants have started to grow, once they have cast off their protective armour of bud scales, exposing delicate

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leaves, they cannot go back, they cannot stop: they must go forward or perish. It is not a reversible reaction. If icy winds blow, or hard frosts come at night, they perish as a poorly clad, ill-nourished person may freeze to death. Nor are such visitations rare. They do irreparable damage in the garden, not amongst alpine plants only, but to fruit trees and other crops. Plants curl up and die wholesale; they were not made for that kind of treatment. Temperature inversion is the direst threat our gardens have to face. Nor is it peculiar to Britain. I have seen terrible devastation in western China, due to drought, or late frost. Probably most losses in the rock garden occur between January and June. We may not be aware of them till the summer, when each label stands like a memorial stone over the grave of the dear departed. The plant does not come up: it has gone home for good.

But while damp and early warmth followed by moderate cold at the wrong season can kill, so also can intense cold at the right season. Occasionally we experience a really hard winter in England, as though to herald the approach of a new ice age. Our plants are exposed to frost from November or December till February or March. They have no special protection. Night after night they are frozen stiff. Under such conditions many succumb. If there were snow also, it might not be so bad. But that rarely happens.¹ Occasionally Britain indulges in a sizzling drought which would compare favourably with parts of South Australia or Arizona. If one has water laid on it is possible to cope with a drought of not too long duration. But the chances are that some of our rock plants, which in nature are not rock plants at all, will die of thirst or heatstroke.

The grisly British climate, then, is revealed as one great executioner. Is it not curious that in our country should be found what is probably the greatest variety of rock garden

¹ The great snow of 1947 probably saved the lives of thousands of rock plants.

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plants in the world, including alpine plants from every important range of mountains? It certainly suggests that, taken all round, our climate is not so black as it is painted. On the average, a great variety of plants can at least tolerate it, and by adjusting themselves ever so little, manage to get along perhaps for years. Then comes a rouser, one of Britain's specials. It may be a long bitter winter without snow, a wet, sunless summer (not so bad that, except for the sun-worshippers and desert plants), a bad inversion with spring in January and winter in May, or a drought lasting two months, and hot at that. Small wonder that each plague has its chosen victims.

Like many other things, climate is all right in moderation. It is excess that injures. Even in their native land plants are sometimes killed, and still more often seriously crippled, by 'dirty weather', just as our wild flowers in Britain sometimes suffer. Is it to be wondered at that strangers cannot cope? Nor is climate the only killer. Plants occasionally die of other things besides too much climate.

Disease, for example. Just as animals, including man, get ill and die, so also do plants. Men and animals too sometimes recover. So do plants. More often, without ever getting rid of the disease, it just doesn't kill them — they carry on. But sick plants are distressing.

Most plant diseases are caused by fungus, that is, they are parasitic diseases. A few are caused by virus. Injury to a tree, the loss of a limb for instance, opens the way for an attack by fungus, whose spores are everywhere. It does not die of shock, or of loss of blood. It can stand a major operation.

In any given region, plants sometimes become immune to certain common diseases. Either they are not attacked at all, or if attacked, the fungus makes little headway, and the plant lives on, not much the worse. Not that the fungus *wishes* to kill its host — that would be a foolish thing to do — for when the plant dies, the fungus must quit. The longer its

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host lives, therefore, the better for the fungus, as well as for the victim.

Naturally, plants from the other side of the world are not immune to our particular brand of fungus; the surprising thing is that most of them have not caught something and died. It would be in accordance with human precedent if they caught some mild disease, unknown in their own country, in a peculiarly virulent form, and died wholesale.

Finally, there is animal life, surface, subterranean, and aerial, much of which regards our rock garden as designed for its special benefit. A succulent shoot appearing cheerfully above the dark earth will be ruthlessly sawn through by slugs during the night, cut off from its base by wireworms working underground, pecked to bits by birds, or otherwise assaulted. Plants have many enemies in the animal world, and though our knowledge of natural history, such as it is, suggests that animals on the whole do as much good as harm, we must remember that our rock garden is not nature. It is indeed very unnatural history. If we left it entirely alone, it would gradually adjust itself to its environment. At the end of a year or two we should find very few of our new and rare alpine alive, and the entire garden would be overgrown with 'weeds'. Two years later it would probably be something different again, but not less overgrown. We are artificially stabilizing it at a chosen level. We must not be surprised, therefore, if our unnatural garden attracts unusual animals, and plenty of them, who regard it as a godsend, a vegetable patch offering many succulent morsels to palates somewhat jaded by a monotonous diet. Everybody knows how birds peck the early crocuses to ribbons, attracted apparently by the colour — at least some colours are pecked much more than others. This does not kill the plant, but from our point of view it spoils it. Slugs and snails are a pest in every rock garden. They lurk in the spongy masses of plants like aubrietia, and in crevices of rock, especially beneath overhanging rocks. Such hideouts should be avoided,

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and no rock of a clinkery nature ought to be exposed. It were better still if no such lava-like rock were used. There are various ways of trapping, killing, and generally discouraging slugs. All I need do here is to place them on the black list, utter a word of warning against them.

In the soil are worms — mostly harmless; bacteria — mostly beneficial; wireworms — pestilential; grubs of all kinds; the pupae of various insects, good, bad and indifferent. A rock garden is bound to attract livestock, particularly of the insect world. No adjustment is possible. You have set up against nature something in unstable equilibrium.

It is up to you to keep it from toppling over, by care, vigilance, and unremitting labour, with an open mind.

You will find it is worth it.

CHAPTER XV

THE MERRY YEAR ROUND

MANY people who garden in a small way prefer to close down in the winter or take to indoor gardening. And who shall blame them! You cannot consider the lilies of the field in an average English winter. Yet the gardening season is being extended every year, and to-day easily covers the autumn and early winter.

Hence more and more people go the whole hog and plan to have a show in the garden all the year round. It is for these stalwarts, to whom gardening is a passion which waits not on the season, that I chiefly write.

To have flowers in the rock garden during the short days and cold nights of late autumn and early winter, we must be prepared to break some of the tabus set out in chapter ix; anyway, rigid rules and narrow regulations were made to be broken by the free peoples of the earth.

I have said somewhere that there is no need for me to add to the number of lists of plants suitable for this, that and the other; such lists will be found in any standard work. Most of the plants suitable for the beginner, and some which are not, are mentioned in the course of this book. But because winter in England is a difficult time for the gardener, and especially for the rock gardener, a short list of some useful autumn and winter plants may help the cold-weather gardener; the list is not exhaustive.

Spring and summer, even most of autumn, can take care of themselves; but as autumn fades into winter it becomes more difficult to ease the passing of the dying year and usher in the birth of the new one. I need only add that for me winter in England consists of December, January, and February, whatever the calendar may say and whatever the earth may do. In the same way summer means June, July,

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and August, and autumn means September, October, and November. Surely we must all of us have felt the absurdity of holding to the belief that spring does not begin until March 21st, long after the crocuses and snowdrops are over, or summer till June 21st, though the lilac and laburnum have been in full bloom for the last fortnight! Vegetation shows no such time lag — or the weather either. No wonder 'summer time' in the country becomes more of a joke than a blessing, and meets with a hostile reception from farmers! How much better and easier it would have been, when reforming the daily revolutions of the sun, to have reformed its annual revolution at the same time. At present the seasons are slavishly hitched to the apparent movements of the sun (or to the real movements of the earth) instead of being adjusted to the march of the vegetation, which, on the whole, so accurately reflects them. Our almanac belongs to the Dark Ages.

AUTUMN

It is not commendable to try to make the rock garden look like eternal summer, even if that were possible. Autumn should look like autumn, not like the spring song transposed to jazz. The contrast of seasons in England is one of our greatest assets, and is best reflected in the garden. But that is no reason why we should not make autumn as bright and colourful as possible, so long as it remains autumnal.

There are a few left-overs from the summer flower crop, and a few late-comers, and no doubt the experienced gardener can blend these successfully. But the beginner at least is advised to concentrate on the latter, since a *rechauffé* is rarely an unqualified success. But flowers are no longer the main crop.

In our damp climate, in the cool temperate zone, the glory of autumn depends mainly on foliage and coloured berries, and upon the forms of plants, which, now that the spring tide of sap is ebbing, become visible behind the shed

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leaves. Now mops, pin-cushions, rosettes, frills, lace, and other vegetable haberdashery reveal themselves, and form takes on a new meaning. Considering the great land masses within our zone which can be drawn on for reinforcements to-day, the twentieth-century rock gardener should be able to, and in fact can, put up a brilliant show of colour before Guy Fawkes Day. It is at this season too that a well-built outcrop of some not unsightly sandstone, limestone, or other natural rock has the advantage over more artificial building material; for if anything, no matter what, has to be naked, it must be easy on the eye; otherwise it is best draped.

The following plants are invaluable for the autumn rock garden, either for their flowers, or coloured fruit, or foliage, or for their beauty of form and line. A few, like *Polygonum vacciniifolium*, boast a combination of good qualities.

In the crocus family extremes meet; they flower very early or very late, and in the autumn make us forget all our good resolutions about not wasting them on the rock garden. For however delightful they are in a different setting, as for example under a cedar tree, they are charming also gathered into true lovers' knots scattered amongst boulders on a gentle slope. Their delicious form and clean lines, no less than their delicate shades of violet, lavender, purple, and lilac, move even the hard-boiled to enthusiasm.

The best for our purpose are:

Crocus longiflorus (lavender); *C. nudiflorus* (white); *C. puchellus* (lilac); *C. speciosus* (blue with purple feathers).

A valuable genus is *Cyananthus*, most garden species of which are autumn flowering. Moreover, they form mats which take up little room and when not in bloom efface themselves; the only danger is that you are apt to efface them yourself. In spite of a sinister reputation they are not too difficult. Try *Cyananthus lobatus insignis* — large deep violet flowers — and *C. microphyllus*. The former at least is easy. *C. Wardii*, a hairy wonder, is probably lost to cultivation. It was never an easy plant.

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The cyclamens have no more business in the rock garden than have the crocuses, and are just as beautiful. Probably the best all-round autumn-flowering species is *C. neapolitanum* which is generous with its favours, besides being of an exquisite shade of pink. A white form is also obtainable. There are one or two others, such as *C. cilicium* (crimson-pink), which are more difficult.

No rock garden is a rock garden unless it includes at least a few gentians, not because they are gentians — I don't give a rap for yellow, or white, or so-called scarlet gentians — but because many of them are of that terrible but irresistible icy sky-blue associated with snow peaks. In Europe most gentians are early summer flowers, but as we travel East they flower later and later, until by the time we reach China they are late autumn flowers. Not all of them are easy, but the veriest beginner might try the following — if he can get them:

Gentiana hexa-Farreri, a daring blue hybrid; *G. sino-ornata*, everyman's favourite; *G. Veitchiorum*, another highly successful Chinaman. Other species may continue to flower after August — it depends a good deal on the season — but they are probably left-overs.

Leucojum autumnale — autumn snowdrop. Another bulbous plant banished from the rock garden, but permitted to return under special licence. With the steady increase in the number of rock garden plants, all bulbs, even miniatures, will be kept strictly to the place where they look best. For the present we may continue to make exceptions for special purposes.

The sedums, of which there are a great many to choose from, were made for the rock garden. They make up in neat habit what they lack in flower strength, and this often colourful if sober appearance they carry through the year. *Sedum canticolum* and *S. kamtschaticum* may be tried for autumn flower.

Last but not least *Verbena chamaedrifolia*, with flowers that

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rarest of all colours, sheer scarlet, should be cherished. *Androsace coccinea* is as good, but is unobtainable until peace is restored in China.

Any of the above-mentioned will be grown mainly for their flowers, and as all of them are small, the outcrop rock garden can accommodate them, although the beginner will probably be content with fewer to start with. If he is wise he will rely more on foliage and coloured berries at this season than on flowers. For this purpose the rosettes of sedum and sempervivum, the mats of *Acaena*, the carpeting gaultherias like *G. procumbens* and *G. thymifolia*, and many other plants are recommended. A special word may be put in for *Polygonum vacciniifolium*, another late flower, which is also evergreen. It produces, in September, a forest of coral-red clubs raised above neat polished leaves and shows little change as it passes into fruit a month later, the coral-red clubs surviving to protect the ever-cheerful leaves till far into the autumn. It is perhaps the gem of this large genus, not all of which are good company.

W I N T E R

Winter is an aggravation of autumn — still longer nights and shorter days, still less sunshine and more rain. The warmth stored up from summer has been spent when winter comes; the cold of winter lags on into spring. There is no disguising the fact that both December and January are difficult months for the rock gardener who gardens on a modest scale, and who is therefore debarred from using any of the shrubs to which other gardeners turn — and do not turn in vain; shrubs red hot with berries, or still holding their leaves, or bursting exultantly into irrepressible flower. Alas, the outcrop rock gardener has no room for these, nor in fact are all of them rock garden plants on any scale; the most he can hope for is a small *Cotoneaster horizontalis*, whose orange-scarlet berries glow like embers. Throughout December the year is still on the wane and, thanks to

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temperature lag, so it is in January. Once January is really over, however, the situation ceases to deteriorate and presently begins to mend. The sun is steadily making its way north, and by mid-February the days are measurably longer, though not perhaps warmer; before the end of the month the soft earth is erupting in little mounds where the first crocuses are pushing all before them.

Winter flowers for the rock garden include crocus, snow-drop, and dwarf iris; there are also several charming dwarf rhododendrons, such as *R. leucaspis*, eligible for the big rock garden, where there is room for shrubs.

Even one or two colonies of snowdrops, such as *Galanthus byzantinus* (a midwinter stalwart for all its frail appearance), will make an enormous difference to your outcrop in February. In addition, a few crocuses spangled over the slope, and drifts of dwarf iris peeping out from amongst the pale rocks, make a picture which on a wintry afternoon is a joy to see. These flowers are heralds. In their green and gold, mauve and violet raiment, they are named Hope and Promise. They are like the rainbow.

The lavender goblets of *Crocus Tommasinianus* suggest brimming cups of nectar called for by thirsty gods; and *C. susianus* is a living nugget of gold. Admittedly crocuses look more dramatic thrust up like the sword Excalibur from the grass under the bare pleached branches of the trees, yet as they ripple down the slope of the outcrop rock garden where there is little as yet, they so transform it that we cannot grudge a few for this purpose.

Iris reticulata is violet, scrawled with golden hieroglyphs on the falls, and *I. unguicularis* and *I. histrioides* are other dwarf gems for the winter outcrop.

Early comers will be found amongst the saxifrages also, for example, *Saxifraga juniperifolia macedonica* and *S. Fortunei*.

Most berried shrubs have lost all their jewellery before the end of January, or it has become tarnished beyond repair. More and more is the gardener dependent on evergreen

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perennials, and the return to life of the flowers which are 'not dead but sleeping'.

Several important aspects of gardening have been altogether omitted from this book. For example, I have said nothing about the propagation of plants in order to increase stock or replace casualties. This, a matter of vital concern to nurserymen, is of only minor importance to the small rock gardener. Nor have I so much as mentioned soil mixtures, that thorny subject on which all experts disagree; or water, except to stress the importance of getting rid of it. Neither have I mentioned soil sterilization, which is important when raising plants from seed, as many large-scale rock gardeners habitually do. All these subjects, and many others of the greatest interest to gardeners, are dealt with in standard works, and the right and wrong things have been said so well so often by so many that there is no reason to repeat them here. I expect the keen gardener to possess at least one standard work on the subject, and to read the gardening papers, and articles in the daily Press.

But even if he does none of these things I believe the beginner, using his common sense and British 'go', will find all the information and encouragement he needs to make a good start, in this book.

CHAPTER XVI

SO LONG

THE following baker's dozen of 18-carat golden rules for the small rock gardener who begins from nothing will prove useful, and may be heeded with advantage even by those who have no intention of following any rules. To the last-named they will serve less as warnings than as signposts to what may safely be ignored. Green-fingered originals should always be encouraged to go their own way, since there are more ways than one of growing a plant or killing a cat. All these rules and regulations have been discussed at greater length in previous chapters.

(1) The most important thing in the world to alpine is sunshine. Let there be light. The only shade needed is that which is given by a north aspect; that is to say, the shadow cast by a rock.

(2) Make certain of good drainage everywhere. Very few rock plants die of thirst, but many are drowned or die of cold feet. Waterlogged soil cannot be tolerated (except in the bog garden).

(3) Though rock plants abhor a damp soil they hate a dry atmosphere even more; this applies especially to alpine. It is easier to lay on dry soil than to lay on damp air. The latter is indeed beyond our powers as yet, though we can mitigate the bad effects of too dry an atmosphere. A cement tank in the middle of the rock garden is no bad thing and need not be unsightly; it does something towards keeping the local air damp. Of course any considerable lake, pond or stream in the vicinity helps. If nothing of the sort is available one must fall back on frequent waterings in dry, hot weather. But very little of the water sprinkled on the earth finds its way directly back into the atmosphere unless,

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of course, it lies on the surface — and in that case there won't be many rock plants to matter.

(4) Having chosen the best possible site for the rock garden, taking all the surroundings into consideration, we can now get on to the actual construction. Remember as a counsel of perfection to use only one kind of rock throughout the building. This is rarely possible unless one lives in the hills or buys the rock; but it is worth remembering.

(5) Build according to a definite plan which you have committed to paper, whether your blueprint is a simple cenotaph of earth and stones; an honest sandstone escarpment facing north, with an alluvial fan tailing off to the west; or one of the latest models representing the Grand Canyon or the Hanging Gardens of Babylon.

(6) Make certain that the whole structure stands like the Pyramids on a firm base, so that not even an earthquake will upset it enough to matter. To do this see that each separate stone is firm, with its largest and flattest surface downwards, and well buried in the earth. If each separate stone is firm, the whole will be firm. If even a few stones wobble, the rock garden must be condemned as unsafe.

(7) Remember that the rocks are there not primarily to be seen and admired, but to benefit the rock plants. They are, like the soil, a means to an end, in this case a co-operative end. Nevertheless they are an important part of the rock garden. The success with which you cultivate rock plants and alpins is inversely proportional to the amount of visible rock.

(8) We come now to the third estate — the soil itself, between, around, and beneath the rocks. On a really good rock garden the soil forms but a small proportion of the whole, perhaps not more than a tenth or a twentieth, whether by weight or bulk. It must be light and sandy, and yet have a certain amount of humus in it deep down. Never, *never* must it be heavy. Clay, of course, is fatal to alpins; it cracks in dry weather, holds water in wet weather, is cold in

SO LONG

winter, too hot and dusty in summer. If your garden is on clay, your only hope is to dig deep foundations and substitute light soil.

The soil may be stony so long as there is plenty of good friable earth between the stones. It must not be rich, and may well be on the poor side; with light, fresh air, and plenty of percolating water; more plants die of over-feeding than of starvation.

(9) Begin with common and easy plants which may be counted on to grow themselves and survive your good intentions. Include a proportion of British wild flowers; it is no shame to support home industry, and some of them are far more beautiful than many an expensive importation from the great open spaces. Besides, if even these turn up their toes on you they can be easily renewed, and at small or no cost.

(10) Keep the size of the plants on your rock garden, and especially their height, proportional to the size of the rocks and to the size of the rock garden as a whole, remembering that they — the plants — are life-size. The rocks are also life-size; but the cliffs and gullies, the screes and fans you built with such eagerness are miniatures. Therefore never use tall plants which stand out like steeples, and never plant upright plants against a skyline. Go in chiefly for plants which have length and breadth but no thickness, so to speak; as cushions, mats, carpets, curtains, and similar vegetable upholstery. Leave spires and columns and obelisks to those who possess natural rock gardens in the hills, or whose gardens cover acres of rock work.

(11) There are four seasons to be provided for, so you must plan well ahead of the clock in order to have colour and form all the year round. Spring and summer present no difficulty, and even autumn nowadays, with its wealth of scarlet, blue and white berries, its evergreen and falling foliage and a few autumn flowers, is no longer difficult. But winter still requires a good deal of thought and skilful choice. Nor can you expect much in the first years; later it will be

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different. In any case, for nine months in the year you can, with a little imagination and forethought, be sure of a colourful display and lots of fun.

(12) The soil is not rich enough to support your chosen plants *and* a multitude of competitors as well; besides, weeds dilute the colours of the rock garden. Therefore you must remove all weeds, and this must be done carefully, otherwise you may disturb and perhaps injure the genuine inhabitants. Hand-weed frequently throughout the growing season.

(13) Finally, remember that the rock garden is like a living organism, made up of many separate parts so closely interwoven that to injure one is in some degree to injure all, and a blemish in one part is in some degree a blemish on the entire rock garden. Try, therefore, to keep the parts properly co-ordinated and you will in time be conscious of having designed and composed that most brave and elusive of artistic creations — an English Rock Garden.

DATE OF ISSUE
21 JUL 1949

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